

9-1450-585-20/990

TM 9-1450-585-20

TECHNICAL MANUAL

ORGANIZATIONAL
MAINTENANCE MANUAL

FOR

**CARRIER,
GUIDED MISSILE EQUIPMENT,
SELF-PROPELLED:
M730 (1450-00-930-8749)
AND
M730A1 (1450-01-121-2122)**

This copy is a reprint which includes current
pages from Changes 1 through 3.

HEADQUARTERS, DEPARTMENT OF THE ARMY
FEBRUARY 1974

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D/ol.11:

MONOXIDE POISONING CAN BE DEADLY

Monoxide is colorless, odorless, DEADLY POISONOUS gas which, when breathed, deprives the body of oxygen and causes SUFFOCATION. Exposure to air contaminated with monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, coma. Permanent BRAIN DAMAGE or DEATH can result from severe exposure. It occurs in the exhaust fumes of fuel-burning heaters and internal-combustion engines and becomes DANGEROUSLY CONCENTRATED under conditions of INADEQUATE VENTILATION. The following precautions MUST be observed to insure the safety of personnel whenever the personnel heater, main, or auxiliary engine of any carrier is operated for maintenance purposes or tactical use.

a. DO NOT operate heater or engine of carrier in an enclosed area unless it is ADEQUATELY VENTILATED.

b. DO NOT idle engine for long periods without maintaining ADEQUATE VENTILATION in cab and cargo compartments.

c. DO NOT DRIVE any carrier with drain plug, access panels and covers, or power plant compartment access panels removed, unless necessary for maintenance purposes.

d. BE ALERT at all times during carrier operation for exhaust odors and exposure symptoms. If either is present, IMMEDIATELY VENTILATE cab and cargo compartments. If symptoms persist, remove affected personnel from carrier and treat as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, administer artificial respiration. THE BEST DEFENSE AGAINST MONOXIDE POISONING IS ADEQUATE VENTILATION.

Danger, monoxide gas: Secure power plant access covers before starting engine.

Exhaust fumes are dangerous. Troubleshoot exhaust system components and replace defective components immediately if fumes are detected. Brace transmission and transfer gearcase securely so they will not fall when separated from engine.

Brace engine and transfer gearcase securely to prevent injury to personnel.

Handle charged fire extinguisher cylinders with care. Do not use water or foam-type extinguishers—these will intensify a magnesium chip fire.

Do not allow battery electrolyte to contact flesh: severe burns will develop.

Fuel flowing over a surface generates static electricity that will result in a spark unless surface is grounded. Provide metallic contact between container and carrier to insure effective ground. Remove reducer from fixed fire extinguisher cylinder valve to prevent accidental discharge of contents.

Winch weight is in excess of 400 pounds; make certain support will withstand this weight to avoid injury to personnel. Replace broken shear pin with pin designed for use in winch; do not substitute other material.

CHANGE

NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 19 November 1984

Organizational Maintenance Manual
for
CARRIER, GUIDED MISSILE EQUIPMENT
SELF-PROPELLED:
M730 (1450-00-930-8749)
AND
M730A1 (1450-01-121-2122)

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To be distributed in accordance with DA Form 12-32 organizational maintenance requirements for the Chaparral Missile System.



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NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 16 August 1983

**Organizational Maintenance Manual
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SELF-PROPELLED:
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Index 1 through Index 6	Index 1 through Index 6
None	DA Form 2028-2
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Cover	Cover

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Distribution:

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CHANGE }

No. 1 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 19 May 1978

**Organizational Maintenance Manual
for
CARRIER, GUIDED MISSILE EQUIPMENT,
SELF-PROPELLED: M730
(NSN 1450-00-930-8749)**

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B-13	B-13/B-14 (Blank)
Index-1 through Index-6	Index-1 through Index-6

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Distribution:

To be distributed in accordance with DA Form 12-32, Organizational Maintenance requirements for Chaparral System.

TECHNICAL MANUAL

NO. 9-1450-585-20

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 15 February 1974

Organizational Maintenance Manual

CARRIER, GUIDED MISSILE EQUIPMENT

SELF-PROPELLED:
M730 (1450-00-930-8749)
AND
M730A1 (1450-01-121-2122)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter DA 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Tank-Automotive Command, ATTN: DRSTA-MB, Warren, MI 48090. A reply will be furnished to you.

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*This manual supersedes TM 9-1450-585-20, 16 September 1968, including all changes.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual contains instructions for organizational maintenance of the M730 and M730A1 Self-Propelled Guided Missile Equipment Carrier as well as descriptions of major units.

b. Appendix A contains a list of current references, including supply manuals, technical manuals, forms, and other available publications applicable to the M730 and M730A1 Guided Missile Equipment Carrier.

c. Appendix B contains the maintenance allocation chart which lists the maintenance responsibilities allocated to each category of maintenance.

d. TM 9-1450-585-20P contains the repair parts and special tools list for the M730 and M730A1 Guided Missile Equipment Carrier.

1-2. Maintenance Allocation

In general, the prescribed maintenance responsibilities will apply as reflected in the maintenance allocation chart (App B). In all cases, where the nature of repair, modification, or adjustment is beyond the scope or facilities of organizational maintenance, the supporting unit should be informed in order that trained personnel with suitable tools and equipment may be provided or other instructions issued.

1-3. Forms, Records, and Reports

a. *Authorized Forms.* The forms generally applicable to units maintaining this materiel are listed in appendix A. For a listing of all forms, refer to DA Pam 310-2. For instructions on use of these forms, refer to TM 38-750.

b. *Field Report of Accidents.*

(1) *Injury to personnel or damage to materiel.* The reports necessary to comply with the requirements of the Army safety program are prescribed in detail in AR 385-40. These reports are required whenever accidents involving injury to personnel or damage to materiel occur.

(2) *Ammunition.* Whenever an accident or malfunction involving the use of ammunition occurs, firing of the lot which malfunctions will be immediately discontinued. In addition to any applicable reports required in (1) above, details of the accident or malfunction will be reported as prescribed in AR 75-1.

c. *Reporting Equipment Improvement Recommendations (EIR'S).* If your carrier needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at U.S. Army Tank-Automotive Command, ATTN: DRSTA-MB, Warren, Michigan 48090. We'll send you a reply.

Section II. DESCRIPTION AND DATA

1-4. Description

a. *General.* The M730 and M730A1 Self-Propelled Guided Missile Equipment Carrier (fig. 1-1 and 1-2) is a full tracked, lightweight, unarmored vehicle designed to carry a Chaparral Aerial Intercept Guided Missile System M48 and launch its missiles. The carrier is air transportable, but not air droppable, and is capable of fording to a maximum 40 inches without installation of a flotation curtain. With the flotation curtain installed, the carrier is amphibious. It can be operated over cross-country terrain and improved highways.

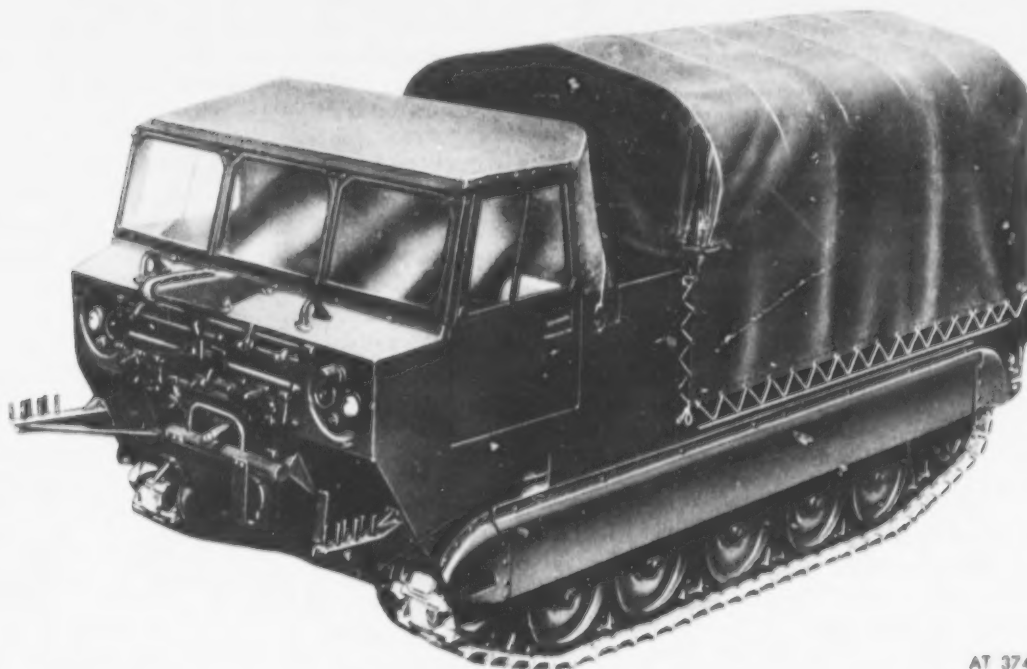
b. *Definition of Locational Terms.* The terms

"front," "rear," "left," and "right" are determined from the normal position of the operator. The operator faces toward the "front" of the carrier, his back is toward the "rear" of the carrier, his right side is toward the "right" of the carrier, and his left side is toward the "left" of the carrier. All items installed on the carrier conform to these terms except the transmission. The transmission locational directions are opposite those of the carrier, since the front of the transmission is toward the rear of the carrier.

c. *Hull.* The hull is of all aluminum construction and is divided into compartments to house the

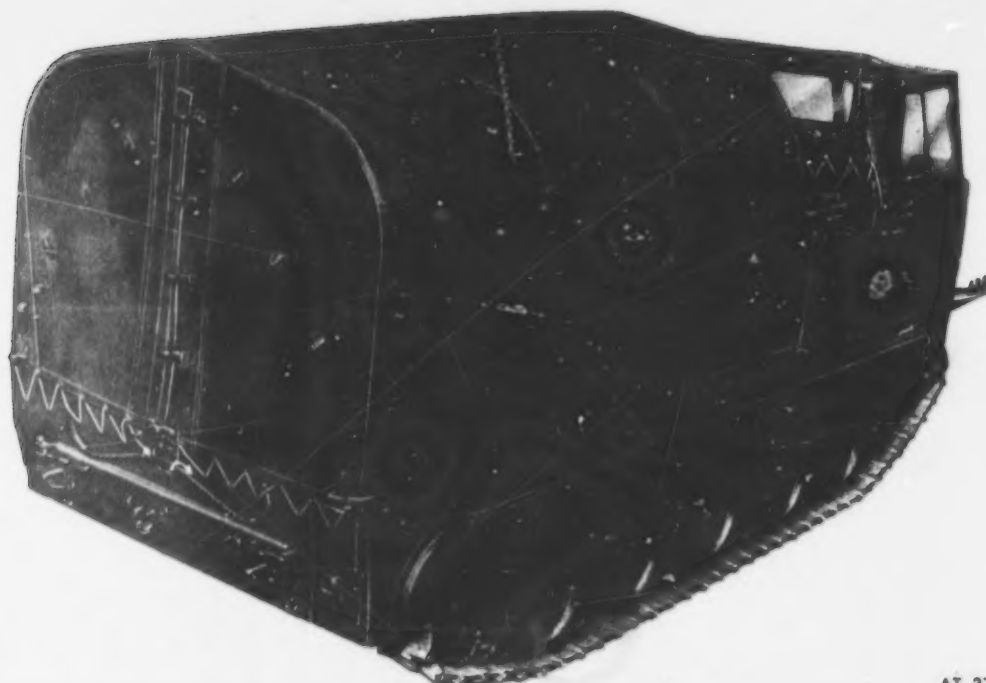
power plant, to furnish an area for driver and crew, to house the radiator and muffler, and to provide space for cargo or missile subsystem. In the rear, a cargo compartment utilizes about three-fourths of the hull space. In the front, a power plant compartment uti-

lizes about one-fourth of the hull space. Above the power plant compartment is the cab for driver and crew, and to the right of the power plant compartment is a compartment for the radiator and muffler (M730), exhaust ducts (M730A1).



AT 3741

Figure 1-1. M730 and M730A1 guided missile equipment carrier — left front view.



AT 3742

Figure 1-2. M730 and M730A1 guided missile equipment carrier — right rear view.

d. *Power Train* (fig. 1-3). The power train furnishes and controls the power to drive and steer the carrier. A power plant, control differential, two final drives, and connecting propeller shafts make up the power train. The power plant consists of the diesel engine, transfer gearcase, and automatic transmission. Power developed by the engine is transmitted to the transfer gearcase which changes the direction of power drive 180 degrees to the transmission. The transfer gearcase also

provides power takeoffs to drive the generator and fan. The transmission delivers the power to the control differential through a propeller shaft. The differential furnishes the power from each side through propeller shafts to the final drives which connect to the sprockets of the suspension system. The engine and transmission control the speed of the power, and the differential can change the speed of the power from one side to the other, providing the method of steering the carrier.

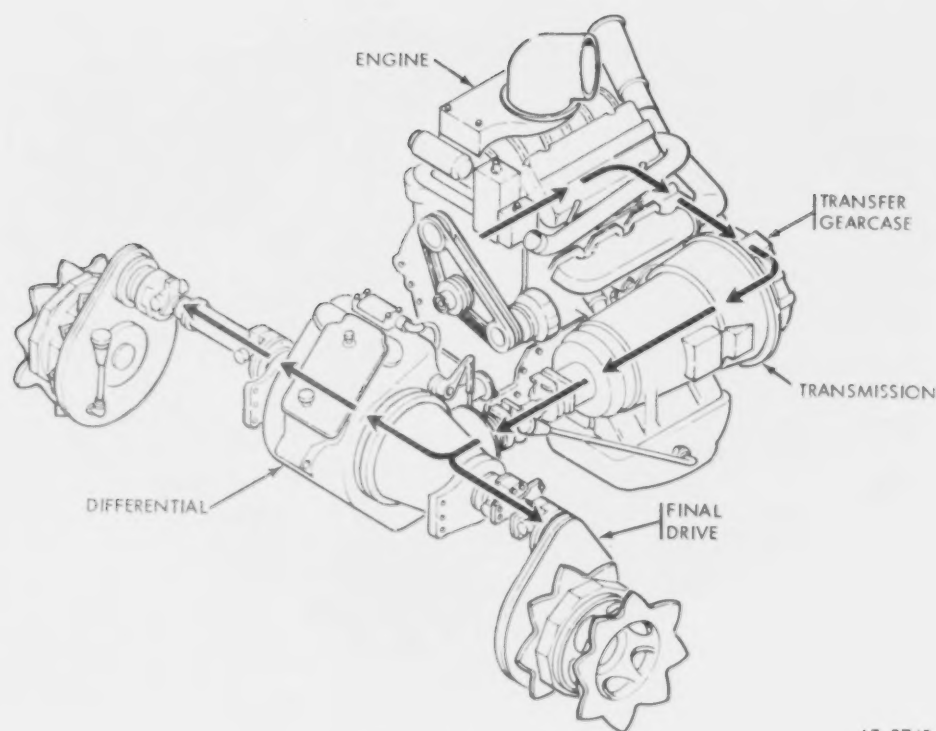


Figure 1-3. Power train.

AT 3743

e. *Cooling System.* Power train cooling is accomplished through an oil cooling system, a coolant (water and antifreeze with corrosion inhibitor) system, and air system.

(1) *Oil cooling system* (fig. 1-4.1). Lubricating oil for the differential, transmission, and engine passes through cores of the oil cooler where the heat of the oil is transferred to the coolant. Oil flows through the engine and the upper oil cooler core through internal passages within the engine except when the oil flows to and from the engine oil filter. Oil is drawn from the bottom of the differential by the differential

oil pump which is mounted on the front of the transfer gearcase. From the pump, the oil flows through the filter and oil cooler and to the top of the differential. An internal pump in the transmission pumps the transmission oil through the oil cooler core and back to the transmission. The transfer gearcase uses a wet sump lubrication system. The wet sump system uses about 2-1/2 quarts of oil that is enclosed in the transfer gearcase. Lubrication is provided by a splash effect as the gears dip into the oil. Oil is added and checked using a filler neck and gage rod that is attached to the bottom of the gearcase.

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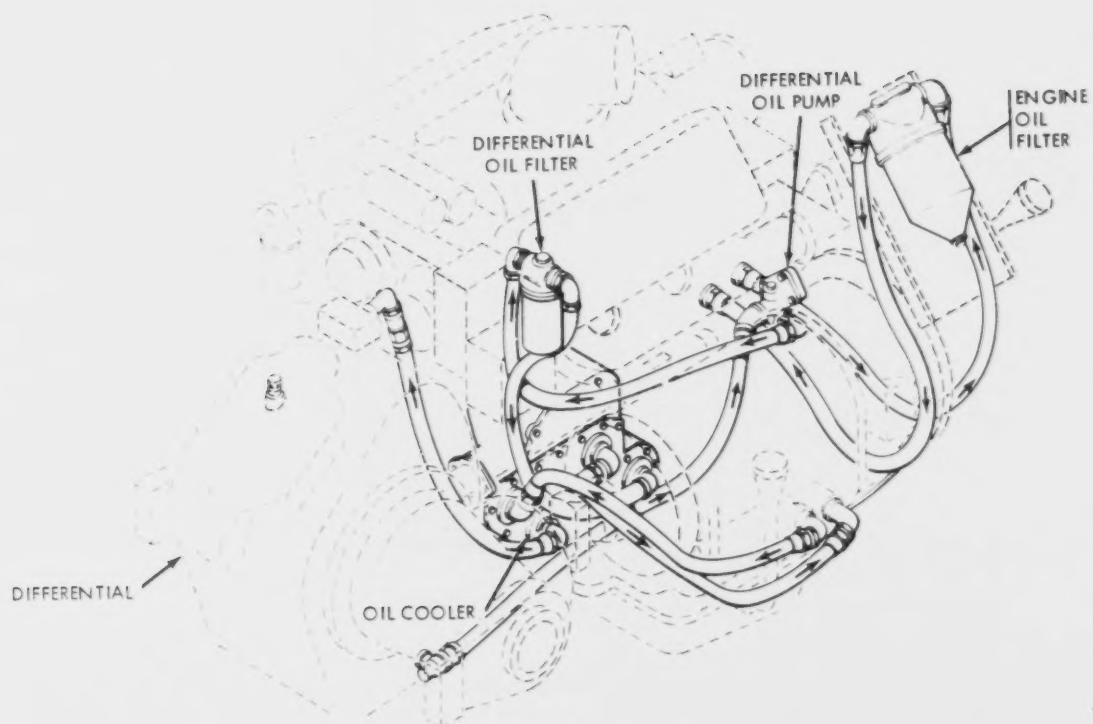
Figure 1-4. Oil cooling system external lines.

(2) *Coolant system* (fig. 1-5). The coolant system consists of a radiator, a coolant pump, thermostat, oil cooler, and connecting hoses and lines. The radiator is mounted in the compartment to the right of the power plant. The coolant pump, thermostat, and oil cooler are integral parts of the engine assembly. Coolant is drawn by the pump from the bottom of the radiator and circulated through the oil cooler, cylinder block, and cylinder heads to the thermostat housing. During the warm-up period when the coolant temperature is below normal operating temperature, the thermostat blocks the flow of coolant to the radiator.

During this period, the pump circulates the coolant through the bypass system to the cylinder block and heads. As the coolant reaches normal operating temperature, the thermostat opens and the coolant is circulated through the radiator. The thermostat is a full bypass type with a range of 162° to 167° F. (closed) to 180° to 182° F. (fully open).

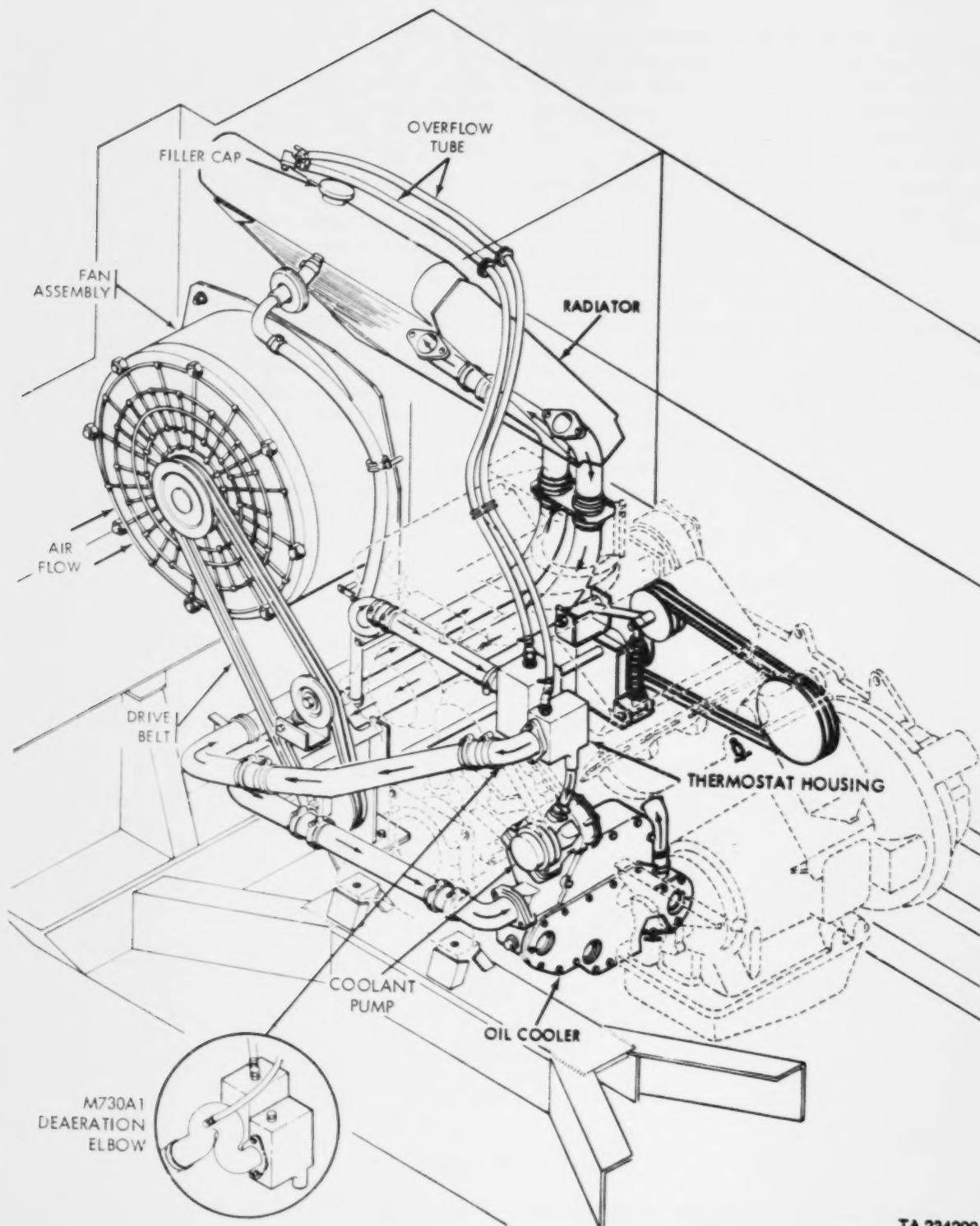
CAUTION

It is essential that coolant level be checked daily and maintained at bottom of coolant filler neck (para 2-80) to prevent overheating and damage to engine.



TA 044128

Figure 1-4.1. Oil cooling system external lines.



TA 234200

Figure 1-5. Air and coolant system major components.

(3) *Air system* (fig. 1-5). The cooling fan, bolted to an enclosed housing in front of the radiator, is driven by V-belts from a drive shaft, which in turn is driven by V-belts from a power takeoff on the transfer gearcase. The cooling fan forces air through the radiator, exchanging the heat from the coolant in the radiator to the air which is forced out of the carrier.

f. Driver's and Personnel Cab. The cab has seating accommodations for the operator and crew. A windshield frame holding three windshield glasses is attached to the front of the cab. A fabric cover is stretched over an aluminum cab cover frame. The driver's controls and instrument panel are located in the left side of the compartment. Before the intercept subsystem can be placed in a ready-to-launch condition, the windshield frame and cab cover assembly must be removed.

g. Fuel System (fig. 1-6). The fuel compartment, located at the bottom rear of the carrier, is an integral part of the carrier hull. Two electric

fuel pumps supply fuel from the fuel compartment to an air separator tank located on the left side of the power plant compartment. The engine fuel pump draws fuel from the air separator tank through the primary fuel filter and forces the fuel through the secondary fuel filter, through fuel inlet passages in the cylinder head, and through fuel lines to the engine fuel injectors. Excess fuel not required for engine operation is returned to the fuel compartment through the air separator tank. An expansion tank, located forward of the fuel compartment, compensates for fuel expansion due to an increase in temperature. When further expansion is required, a pressure relief valve, located in the right rear fender, will open allowing excess fuel to escape. An air intake valve, located on the right end of the expansion tank, allows air to enter the tank or compartment as fuel is used. Since the fuel filler cap is sometimes below water during carrier operation, the cap must have an airtight fit at all times.

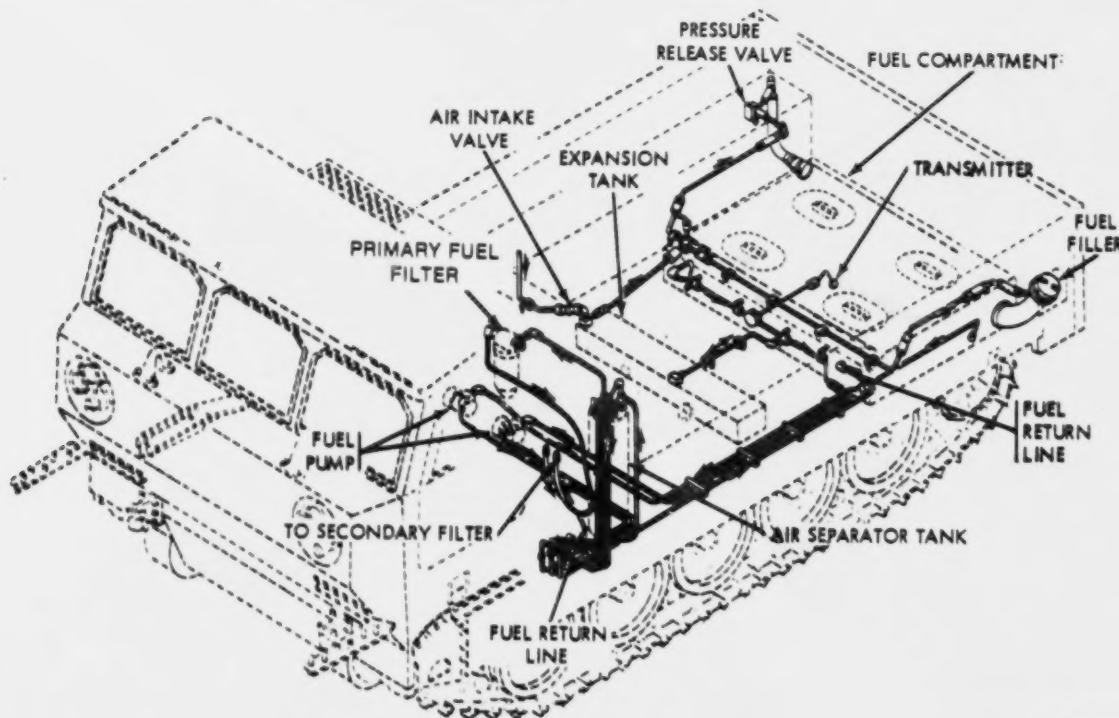
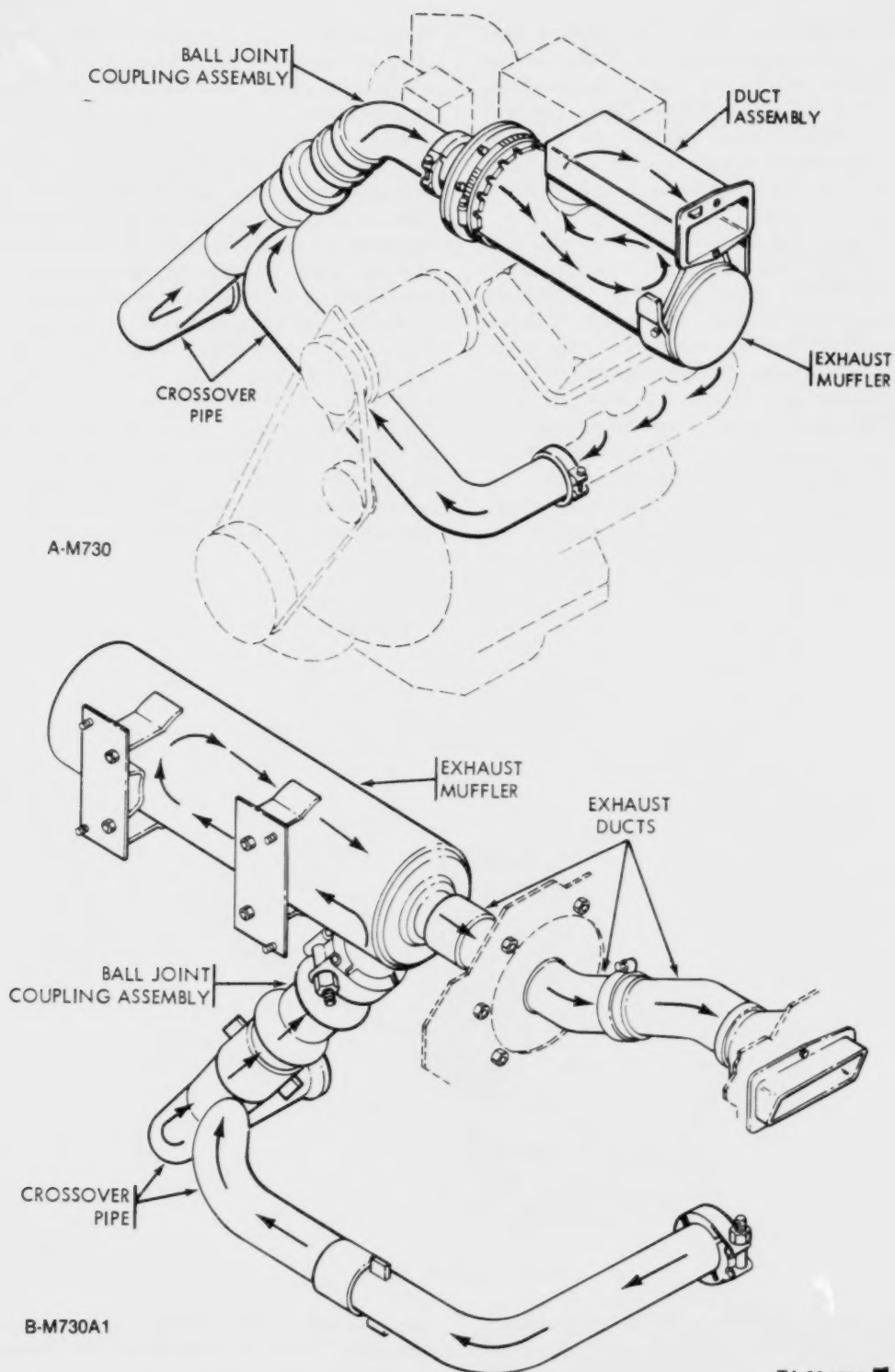


Figure 1-6. Fuel system.

TA 234250 ■

h. Air Intake System (para 2-75). Combustion air for the engine is drawn in by the engine blower and filtered through a dry-type air cleaner assembly. The air cleaner assembly is attached to the transverse beam and is accessible after opening

the cab center seat section. On carriers after serial number C-308, a mechanical air cleaner indicator is installed to indicate when the air cleaner element requires cleaning.



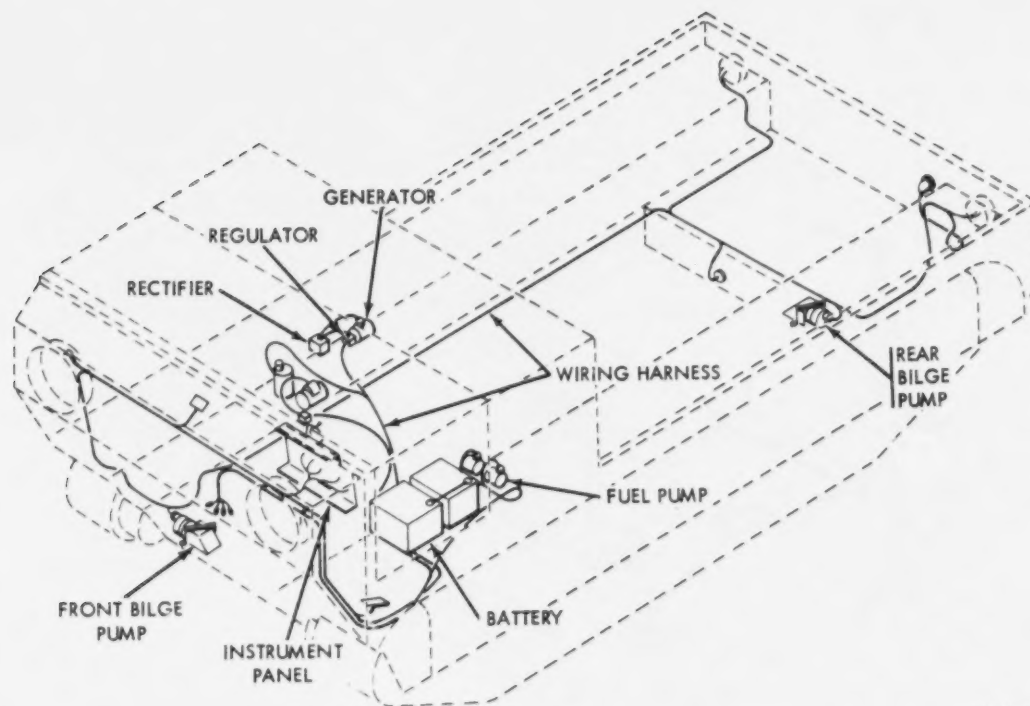
TA 234202 ■

Figure 1-7. Exhaust system.

i. *Exhaust System* (fig. 1-7). Burnt gases created by engine combustion pass through the crossover pipes into the muffler which decreases the engine noise. The gases then pass through the duct or exhaust pipe (M730A1) assembly and out the right side of the carrier. Air from the fan assembly, circulating around the radiator, partially cools the exhaust system.

j. *Electrical System* (fig. 1-8). The 24-volt dc electrical system consists of several systems interconnected by wiring harnesses and cables. These systems are the battery and generating, starting,

lighting and horn, power plant, fuel, bilge pumps, and hull and miscellaneous electrical systems. Two 12-volt batteries, connected in series, supply the energy for operation of equipment when the engine is not operating and for starting the engine. Battery drain is replenished and system voltage is maintained by the alternating current generator. The battery recharge current flow and system voltage is regulated by the generator-regulator. For ease of maintenance, this manual separates the carrier electrical system into functional systems and describes each functional system separately.

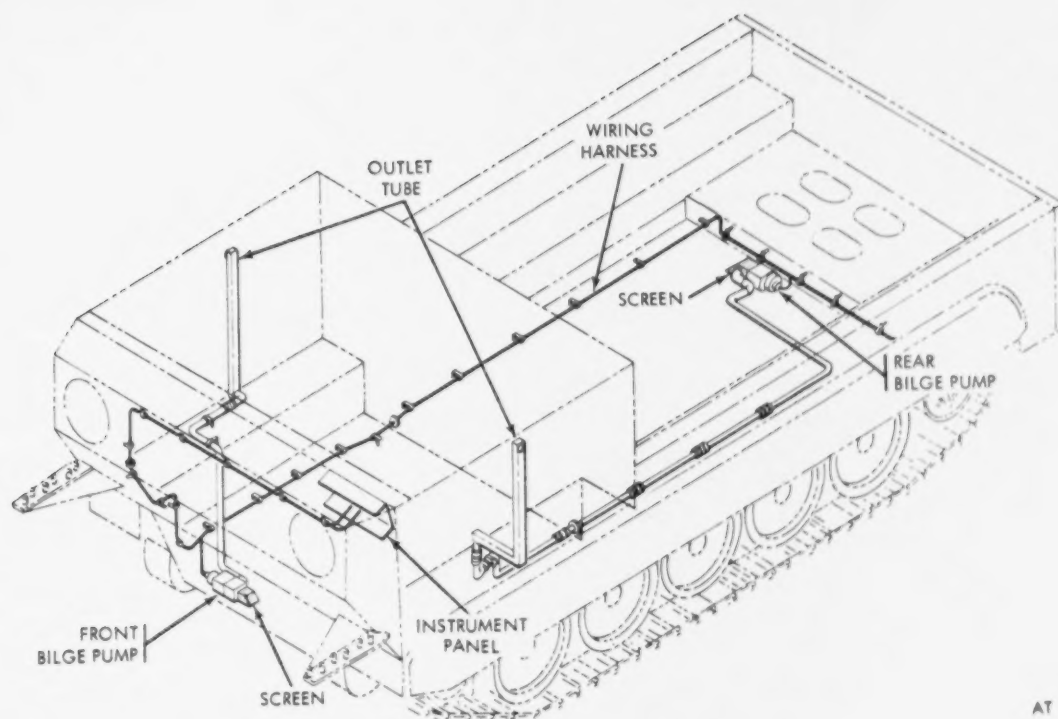


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Figure 1-8. Electrical system.

k. *Bilge Pump System* (fig. 1-9). The bilge pumps are actuated by a switch located on the driver's instrument panel. Water drawn from the hull by the bilge pumps passes through tubes and

out of the carrier through outlets located close to the cab doors. Screens on the bilge pump intakes prevent debris from clogging or damaging the pumps.



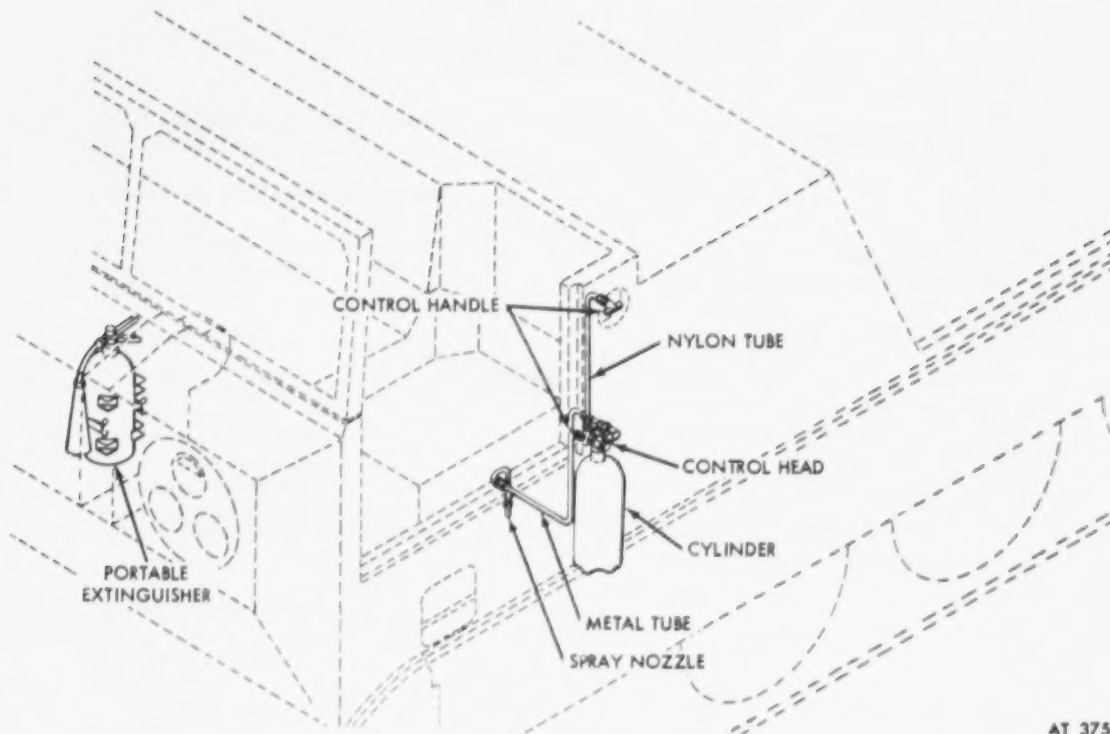
AT 5670

Figure 1-9. Bilge pump system.

1. Fire Extinguisher System (fig. 1-10).

(1) *Fixed fire extinguisher.* The fixed fire extinguisher consists of a cylinder containing a 5 pound carbon dioxide (CO_2) charge, control head, spray nozzle, and nylon and metal tube assemblies. The extinguisher is mounted on the left bulkhead beside the driver's seat. When released, the extinguisher floods the power plant compartment with CO_2 . Controls for the extinguisher

can be operated from inside the carrier by a handle on the control head or from outside the carrier by a handle close to the bilge outlet. The exterior handle is connected to the control head by a cable enclosed in a nylon tube assembly. The handles actuate the control head which releases the CO_2 from the extinguisher cylinder. The gas passes through a metal tube assembly, sprays into the engine compartment, and smothers the fire.



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Figure 1-10. Fire extinguishing system.

(2) *Portable fire extinguisher.* The portable fire extinguisher consists of a cylinder containing a 5 pound CO₂ charge, control head, and spray nozzle, and is stowed in the front of the cab. The extinguisher is secured with a clamp assembly which provides quick access in case of fire.

m. Winch. Power to drive the winch is provided from a power takeoff attached to the side of the transmission. The power takeoff is engaged by a control located in the driver's cab. A cable connects the control to a lever on the side of the power takeoff. When engaged, the power takeoff drives the winch transfer gearcase through a propeller shaft. The transfer gearcase attaches to and drives the input shaft of the winch. The winch drum holds 200 feet of $\frac{3}{8}$ -inch wire rope.

n. Personnel Heater System. Refer to paragraphs 3-1 through 3-25 for information pertaining to the personnel heater.

o. Engine Coolant Heater Kit. Refer to paragraphs 3-26 through 3-48 for information pertaining to the engine coolant heater kit.

p. Flotation Curtain. Refer to TM 9-1450-585-10 for information pertaining to the flotation curtain.

1-5. Tabulated Data

Table 1-1 lists data for performing organizational maintenance. Other data, necessary to service and operate the carrier, are contained in TM 9-1450-585-10.

Table 1-1. Tabulated Data

a. Engine.

Manufacturer	Detroit Diesel Allison Division—GMC
Model	5063—5299
Series	6V53
Type	two-cycle diesel-compression-ignition.
Idle speed	550—800 rpm
Horsepower	210 at 2,800 rpm
No-load governor speed	2,925—2,975 rpm
Crankshaft rotation (viewed at pulley) (front)	clockwise
Cylinder number:	
Left bank front to rear	1L, 2L, 3L
Right bank front to rear	1R, 2R, 3R
Firing order	1L, 3R, 3L, 2R, 2L, 1R
Fuel types:	
Grade DF-2 (VV-F-800)	do not use below +32° F.
Grade DF-1 (VV-F-800)	do not use below —10° F.
Grade DF-A (VV-F-800)	use for all temperatures
CITE (MIL-F-46005)	use for all temperatures
JP-5 (aircraft turbine engine).	emergency conditions above —40° F.

b. Transmission.

Manufacturer	Allison Division—GMC
Model	TX 100-1
Speeds	3 fwd, 1 rev
Ranges	4 fwd, 1 rev

c. Transfer Gearcase.

Manufacturer	FMC Corporation
Gear ratio	1.286:1
Power takeoffs	4

d. Steering Control Differential.

Manufacturer	FMC Corporation
Model	DS200
Suspension points	3

e. Engine Cooling System.

Capacity (approx)	12.75 gal
Refill (approx)	9.5 gal
Thermostat range (by-pass type)	162°—167° to 180°—182° F.

f. Batteries.

Type	6 TN
Voltage (two 12-volt in series)	24v

g. Generator.**NOTE**

Generator 7954720 (19207) must be used with rectifier 7954343 (19207) on carriers C-1 through C-143.

Manufacturer	Leece-Neville
Model	A001-5300GP
Part number	7954720 (19207)
Type	alternating current

or

NOTE

Generator 10947517 (19207) is used on carriers after C-143 without rectifier 7954343 (19207).

Manufacturer	Leece-Neville
Model	A001-2184AC
Part number	10947517 (19207)
Type	alternating current w / silicone rectifiers
Rated volts	28
Rated amperes	100
Speed range	2,000 to 8,000 rpm
Rotation	reversible

Table 1-1. Tabulated Data—Continued

h. Starter.

Manufacturer	Delco-Remy Division—GMC
Model	16764-1113940
Type	4-pole, 24V
Brushes	4
Rotation (viewed from drive end)	cw
Type of engagement	Shift lever solenoid plunger
Internal wiring	series

i. Rectifier.**NOTE**

Used with generator 7954720 (19207) only on carriers C-1 through C-143

Manufacturer	Leece-Neville
Type	C0011106CA
Rated volts	28v
Rated amperes	100 amp

j. Voltage Regulator.

Manufacturer	Vap-Air Division-Vapor Corporation
Model	26440001-03 or -4
	or
Manufacturer	Leece-Neville
Model	5027RC
	or
Manufacturer	Leland
Model	07639-CSV-2183-1
Part number	10947439 (19207)
Rated volts	28vdc
Rated amperes	100

k. Engine Oil Low Pressure Transmitter.

Manufacturer	A.C. Spark Plug Division—GMC
Breaks contact	9-13 psi

NOTE

Late models are equipped with a more sensitive pressure switch 5930-944-1660 (4-8 psi).
Install switch 5930-944-1660 (4-8 psi) in place of switch 5930-692-9258 (9-13 psi).

l. Differential and Transmission Oil High Temperature Transmitter.

Manufacturer	A.C. Spark Plug Division—GMC
Operating temperature	305° F.
Reset temperature (approx)	275° F.

m. Winch.

Manufacturer	Gar Wood
Weight:	
Complete	444 lb
Less wire rope	313 lb
Gear ratio	29:1
Line pull	20,000 lb

n. Winch Transfer Gearcase.

Manufacturer	FMC Corporation
Weight	21½ lb
Gear ratio	2.05:1

CHAPTER 2

SERVICE AND MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

2-1. General

a. When a new or reconditioned carrier is first received by the using organization, it is the responsibility of the officer in charge to determine if the carrier is properly prepared for service and if it is in condition to perform any mission to which it may be assigned.

b. Perform a "break-in" road test of at least 50 miles on all new or reconditioned carriers (para 2-4) and road test used carrier a sufficient number of miles to insure proper operation according to procedures in paragraph 2-15.

c. Whenever practicable, the carrier driver and crew will assist in the performance of these services.

2-2. Preliminary Services

a. General Procedures.

(1) If any exterior surfaces are coated with rust-preventive compound, remove it with dry cleaning solvent or mineral spirits paint thinner.

(2) Read the processing and deprocessing record for shipment, storage, and issue of vehicles and spare engines DD Form 1397 (Processing and Deprocessing Record for Shipment, Storage and Issue of Vehicles and Spare Engines) and follow the precautions checked thereon. This form should be in a waterproof envelope attached to one of the headlights. A duplicate copy will be found in the driver's cab.

(3) Read the deprocessing warning tags attached to the engine, radiator filler neck, and in the driver's cab and observe the warnings thereon.

(4) Follow the general procedures given in paragraphs 2-12 through 2-14.

b. *Specific Procedures.* Perform the specific procedures outlined in paragraph 2-3.

2-3. Specific Procedures

a. *Remove Closure Kit Shipping Cover* (fig. 2-1).

(1) Remove four cap screws (15) and 16 flat washers (14) securing four closure straps (2) to carrier in four track shroud (16) mounting holes. Discard four screws and retain four flat washers.

(2) Remove four lag bolts (4) and flat washers (3) securing four closure straps (2) to cab closure (1), and remove straps.

(3) Remove cab closure (1) from carrier, and

place blast covers in stowed position (TM 9-1450-585-10).

(4) Install four screws (15) (stowed in cab) and retained flat washers (14) in track shroud (16) mounting holes.

NOTE

The shipping closure, rear compartment floor cover, and attaching hardware are reusable items. Do not damage. Keep attaching hardware with shipping closure. Refer to direct support maintenance personnel for disposition of these items.

(5) Position blast covers in stowed position, and remove and stow blast cover frame (TM 9-1450-585-10).

b. Remove equipment packages containing basic issue items (BII), cab cover, windshield, windshield wiper arms and blades, side door windows, rear compartment cover, and related parts from rear compartment.

c. Remove equipment packages containing towing hooks, towing pintle, exhaust duct, bottom access plate, gasket, and hull drain plates from cab.

d. Remove tape seals from the following:

- (1) Engine crankcase breather.
- (2) Air intake opening.
- (3) Engine gage rod shroud opening.
- (4) Oil filler cap.
- (5) Battery cables.
- (6) Backrest and seats.
- (7) Launcher mounting holes.
- (8) Bilge pump outlets.
- (9) Light lenses.

e. Remove plastic plugs from launcher mounting holes.

f. Restore tension on generator (para 2-106), fan (para 2-85), and coolant pump (para 2-81) drive-belts.

g. Install air cleaner hose on engine air intake (para 2-74).

h. Remove screen from hull bottom access opening; unpack access plate, gasket, and drain plates; and install access plate, gasket, and drain plates in bottom of hull (para 2-223).

i. Unpack and install towing hooks on front and rear of carrier (para 2-234).

j. Unpack, inventory, and stow basic issue items

(BII) (TM 9-1450-585-10) on carrier. Record missing or damaged items.

k. Unpack batteries and electrolyte, fill batteries to prescribed level with electrolyte (approx 2 gal per battery), and install batteries in carrier (para 2-98). Connect batteries, noting polarity.

l. Unpack and install towing pintle on tailgate (para 2-235).

m. Remove rear compartment floor cover (fig. 2-1).

(1) Remove four nuts (5), lock washers (6), anchor plates (7), retaining plates (8), and screws (9) securing cover (10) to support channels in rear compartment.

(2) Remove rear compartment floor cover from carrier.

n. Remove blast deflector brackets (fig. 2-1).

(1) Remove two cap screws (11) and lock washers (12) securing left bracket (13) to hull, and remove bracket.

(2) Remove two cap screws (11) and lock washers (12) securing right bracket (13) to hull, and remove bracket.

o. Unpack cab cover, windshield, windshield wiper arms and blades, side door windows, rear compartment cover, and related parts.

(1) Install windshield (para 2-232).

(2) Install and adjust windshield wiper arms and blades (para 2-255).

(3) Install cab side frames, cross bow, and cover (para 2-231).

(4) Install side door windows (para 2-226).

(5) Install rear compartment stanchion bases, stanchions, bows, cover, and bow stowage brackets (para 2-251).

p. Unpack and install exhaust duct on right side of carrier (para 2-77).

q. Perform a complete suspension lubrication in accordance with LO 9-1450-585-12.

r. Prepare engine for starting.

(1) *Fuel carrier.* While fueling carrier, check for leaks at filler connections and fuel compartment drain plug.

(2) Check DD Form 1397 for engine, transmission, differential, and final drives oil type and viscosity. If this form indicates that oil in these units is suitable for 1,000 miles of operation and is of proper viscosity for local operation (LO 9-1450-585-12), check oil level and add correct oil as necessary, but do not change oil.

(3) Perform before-operation preventive-maintenance checks and services (TM 9-1450-585-10).

(4) Crank engine at least two revolutions with fuel cutoff control pulled out to check for

hydrostatic lock (TM 9-1450-585-10).

(5) Start and run engine (TM 9-1450-585-10), and check immediately for fuel, coolant, and oil leaks. Disregard smoky exhaust for first few minutes of operation since some rust-preventive fuel and preservative oil will be in the system when the engine is started and will burn along with the regular fuel.

s. Check operation of all controls (TM 9-1450-585-10).

t. Clean winch and winch cable:

(1) Remove preservative coating from winch external moving parts using dry cleaning solvent (SD) or mineral spirits paint thinner.

(2) Unreel winch cable (TM 9-1450-585-10), and remove preservative coating from cable using dry cleaning solvent (SD) or mineral spirits paint thinner. Coat cable in accordance with LO 9-1450-585-12, and rewind cable on drum.

u. Clean pivot steer brake disks:

(1) Place transmission range selector shift lever in 1-2 range.

(2) Release differential brakes.

(3) Slowly depress accelerator pedal until carrier reaches speed of 3 mph.

(4) Release accelerator pedal, and pull back on both pivot steer levers evenly and firmly until carrier comes to a complete stop.

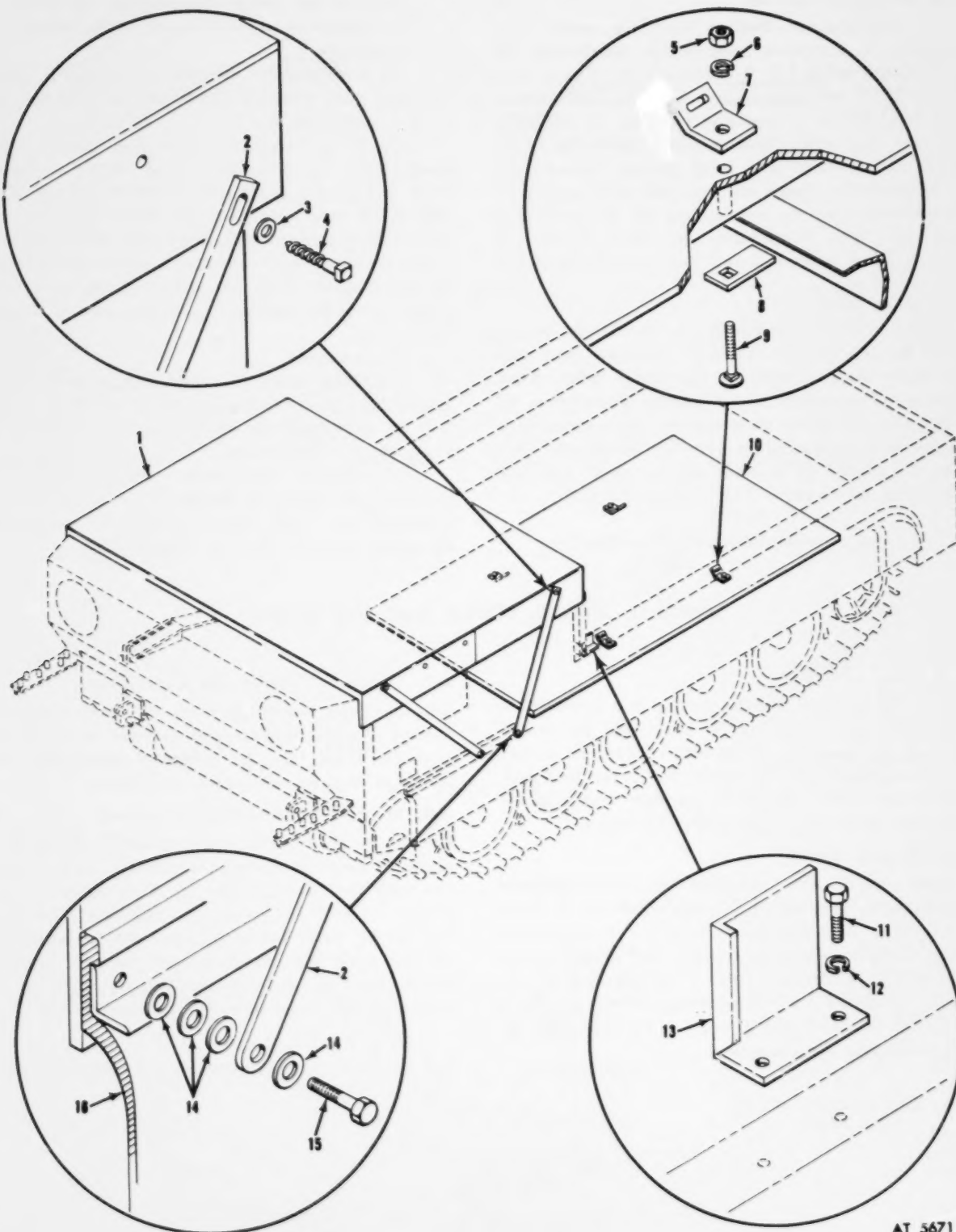
(5) Check for hydraulic fluid leaks, and repeat (1) through (4) above until braking surfaces on disks are clean.

v. Perform the quarterly "Q" preventive-maintenance checks and services as outlined in table 2-2.

w. Perform break-in services (para 2-4).

Legend to fig. 2-1.

- 1 Cab closure
- 2 Closure strap
- 3 Closure strap flat washer
- 4 Closure strap lag bolt
- 5 Rear compartment floor cover nut
- 6 Rear compartment floor cover lock washer
- 7 Rear compartment floor cover anchor plate
- 8 Rear compartment floor cover retaining plate
- 9 Rear compartment floor cover retaining plate screw
- 10 Rear compartment floor cover
- 11 Blast deflector bracket cap screw
- 12 Blast deflector bracket lock washer
- 13 Blast deflector bracket
- 14 Closure strap flat washer
- 15 Closure strap cap screw
- 16 Track shroud



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2-4. Break-In Service

a. Lubrication. Before starting road test, perform a complete suspension lubrication in accordance with LO 9-1450-585-12. Check DD Form 1397 for engine, transmission, differential, and final drives oil type and viscosity. If this form indicates that oil in these units is suitable for 1,000 miles of operation and is of proper viscosity for local operation, check oil level and add correct oil as necessary, but do not change oil. If carrier has received this lubrication in the course of deprocessing (para 2-2 and 2-3), repetition is not necessary.

b. Road Test.

(1) For the first 5 miles of operation, do not drive the carrier faster than 10 miles per hour and not faster than 20 mph for the next 5 miles. After 10 miles of operation, speed may be increased to 30 mph. After 20 miles of operation, the carrier may be driven up to maximum governed speed, and then may be placed in normal service until the first scheduled oil change (LO 9-1450-585-12).

NOTE

If a new or reconditioned carrier has been

driven to the using organization, consider the mileage so traveled as part of the break-in mileage.

(2) Continually observe instrument panel indicator and warning lights during road test for proper operation.

(3) Do not engage in excessive speeds, rapid acceleration, or in any way load engine or power train to capacity during the break-in period. Stop after 5, 10, and 20 miles of operation, and drive the carrier in reverse for at least 50 feet. Make external observations around the carrier; check particularly for overheated hubs on road wheels and idler wheels, and for lubricant, coolant, and hydraulic fluid leaks.

c. Deficiencies.

(1) Deficiencies disclosed during preliminary inspection and servicing or during break-in period will be corrected by the using organization or supporting maintenance.

(2) Serious deficiencies which appear to involve unsatisfactory design or material will be reported on DA Form 2407 (Maintenance Request) as prescribed in TM 38-750.

Section II. PARTS, TOOLS, AND EQUIPMENT

2-5. General

Tools, equipment, and repair parts are issued to organizational maintenance personnel for maintaining the materiel. Tools and equipment should not be used for purposes other than prescribed and, when not in use, should be properly stored in the tool bag and/or roll provided for them.

2-6. Repair Parts

Repair parts are supplied to organizational maintenance personnel for replacement of those parts that become worn, broken, or otherwise unserviceable, providing replacement of these parts is within their scope. Repair parts supplied for the M730 Guided Missile Equipment Carrier are listed in TM 9-1450-585-20P, which is the authority for requisitioning replacements.

2-7. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are authorized for issue by tables of allowances and tables of organization and equipment.

2-8. Special Tools and Equipment

Certain tools and equipment specially designed for organizational maintenance, repair, and general use with the materiel are listed in table 2-1 and shown in figure 2-2 for information only. This list is not to be used for requisitioning replacements. Special tools for organizational maintenance are listed in TM 9-1450-585-20P, which is the authority for requisitioning replacements.



(1) ADAPTER



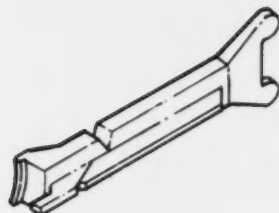
(2) ADAPTER



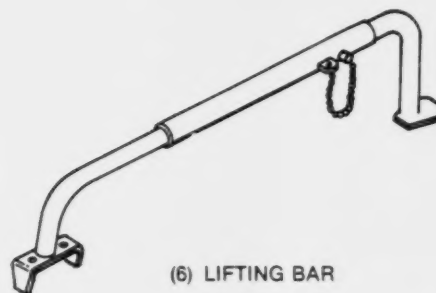
(3) TRACK CONNECTING FIXTURE



(4) WEAR GAGE



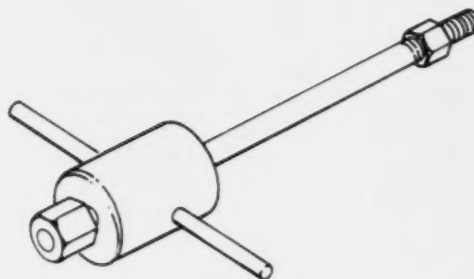
(5) LIFTER



(6) LIFTING BAR



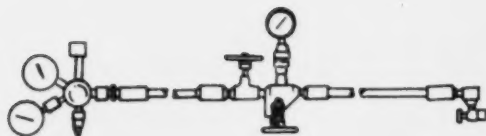
(7) DRIVE PIN PUNCH



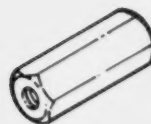
(8) MECHANICAL PULLER



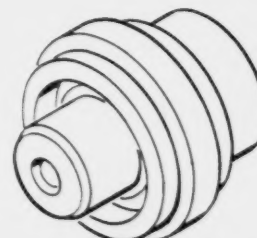
(9) RADIATOR
CLEANING
TOOL



(10) ACCUMULATOR CHARGING REGULATOR



(11) REMOVER



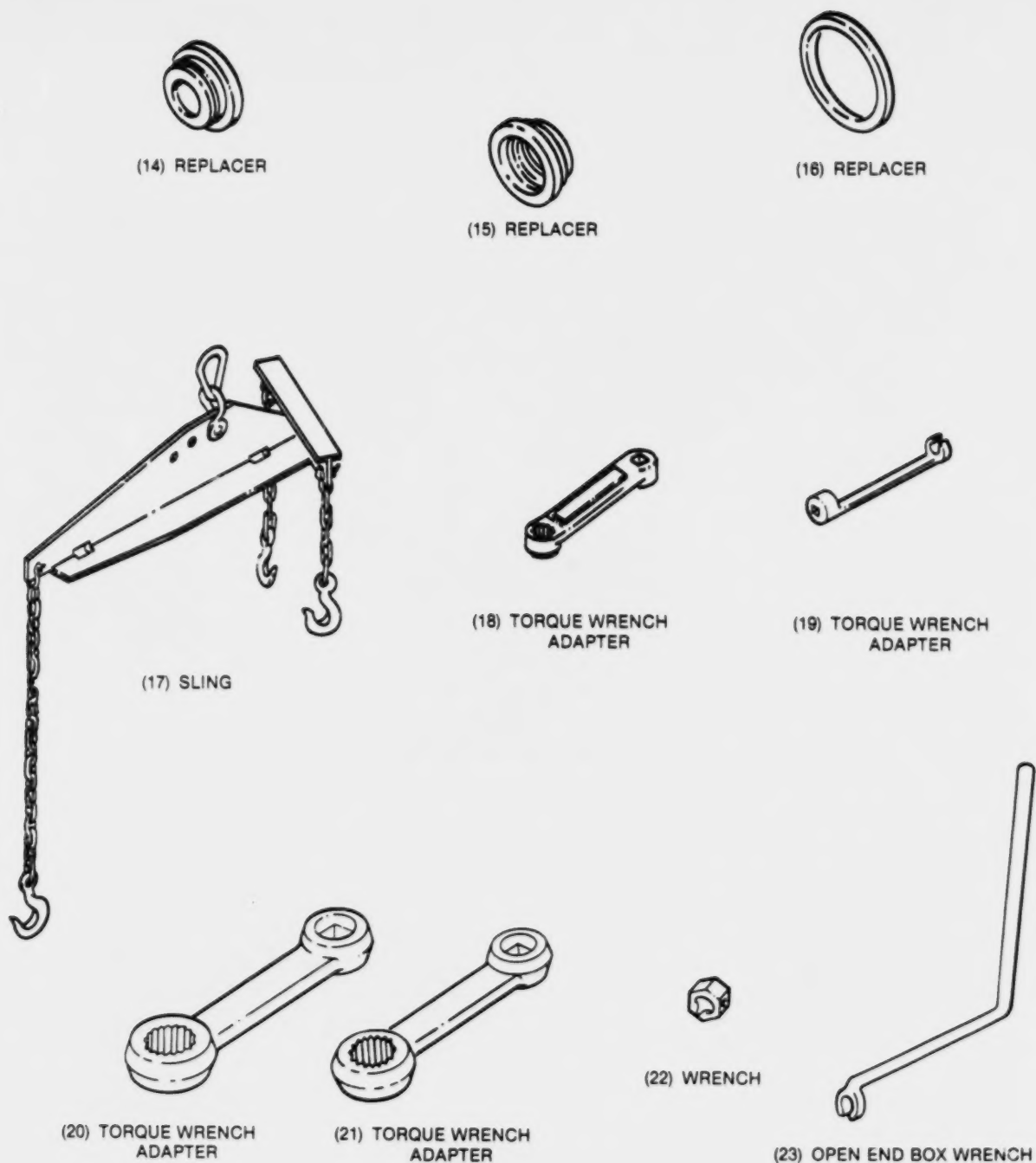
(12) REMOVER AND
REPLACER



(13) REMOVER AND
REPLACER

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Figure 2-2. Special tools and equipment (sheet 1 of 2).



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Figure 2-2. Special tools and equipment (sheet 2 of 2).

Table 2-1. Special Tools and Equipment

Item	Identifying Number	References		Use
		Fig.	Para.	
1. ADAPTER.....	5120-00-322-5953 (7083703-19207)	2-130	2-197	To remove torsion bar; used with puller 5120-00-557-3615.
2. ADAPTER.....	5120-00-933-8458 (11592843-19207)	2-2	—	To remove track pin; used with puller 5120-00-557-3615.
3. FIXTURE.....	5120-01-041-4624 (12253183-19207)	2-2	—	To break or connect track (TM 9-1450-585-10).
4. GAGE.....	5120-01-041-9920 (12253280-19207)	2-119	2-188	To check sprocket wear, track tension, and bushing wear.
5. LIFTER.....	5120-01-062-5607 (12268612-19207)	2-129	2-196	To lift road wheels.
6. LIFTING BAR.....	5120-00-918-0586 (11589384-19207)	2-111	2-175	To lift final drive assembly.
7. PIN, drift.....	5120-01-006-8847 (11678718-19207)	2-2	—	To remove track pin (TM 9-1450-585-10).
8. PULLER.....	5120-00-557-3615 (5573615-19207)	2-131	2-197	To remove torsion bar; used with adapter 5120-00-322-5953.
9. RADIATOR CLEANING TOOL...	4910-00-611-6559 (11678393-19207)	2-2	2-87	To clean radiator fins while radiator is still in carrier.
10. REGULATOR, accumulator, charging.....	4910-00-861-2068 (11615420-19207)	2-49	2-63	To recharge air box heater accumulator.
11. REMOVER.....	5120-01-102-4628 (12269380-19207)	2-2	—	To remove shock absorber.
12. REPLACER.....	4910-01-128-0092 (12269522-19207)	2-133	2-199	To install road wheel arm housing bearings and oil seal.
13. REMOVER AND REPLACER.....	5120-00-740-3346 (10943279-19207)	2-2	2-158	To remove or install differential and transfer gearcase resilient mounts.
14. REPLACER.....	5120-00-678-2796 (10863002-19207)	2-128	2-193	To install road wheel, idler wheel hub inner or outer bearing cup (M730).

NOTE

Used on M730 for idler wheel; on M730 and M730A1 road wheel bearing cup.

15. REPLACER.....	5120-01-102-4627 (12269371-19207)	2-2	—	To install idler wheel hub inner and outer bearing cup (M730A1).
16. REPLACER.....	5120-00-678-2797 (10863001-19207)	2-128	2-193	To install idler and/or road wheel hub oil seal.
17. SLING.....	4910-00-646-6893 (10942647-19207)	2-16	2-30	To lift power plant.
18. TORQUE WRENCH ADAPTER.....	5120-00-977-7421 (10917666-19207)	2-110	2-173	To torque power train universal joint cap screws.
19. TORQUE WRENCH ADAPTER.....	5120-00-019-5232 (10881875-19207)	2-2	—	To torque fuel line nut.
20. TORQUE WRENCH ADAPTER.....	1025-00-215-8200 (11663358-2-19207)	2-2	—	To torque transfer case left mounting bolt.
21. TORQUE WRENCH ADAPTER.....	5120-00-213-6976 (11663358-1-19207)	2-109	2-174.1	To torque 7C U-joint cap screws.
22. WRENCH, plug.....	5120-00-053-3625 (10932504-19207)	2-131	2-197	To remove torsion bar access plugs.
23. WRENCH, tubing, nut.....	5120-00-740-3347 (10949344-19207)	2-42	2-55	To loosen and tighten fuel return line nut.

Section III. LUBRICATION

2-9. Lubrication Order (LO)

LO 9-1450-585-12 prescribes cleaning and lubrication procedures as to locations, intervals, and the proper materials for this vehicle. Lubrication to be performed will be in accordance with the maintenance allocation chart (app B) and the lubrication order. Whenever necessary, organizational maintenance personnel will assist in the lubrication of the materiel.

2-10. General Lubrication Instructions

a. General. Any special lubrication instructions required during maintenance operations for specific mechanisms or parts are covered in the pertinent section. See LO9-1450-585-12 for all other lubrication instructions.

b. Service Intervals. Service intervals specified on the lubrication order are for normal operation and where moderate temperature, humidity, and atmo-

spheric conditions prevail. For lubrication procedures and instructions under unusual conditions, refer to paragraph 2-14f.

c. Reports and Records.

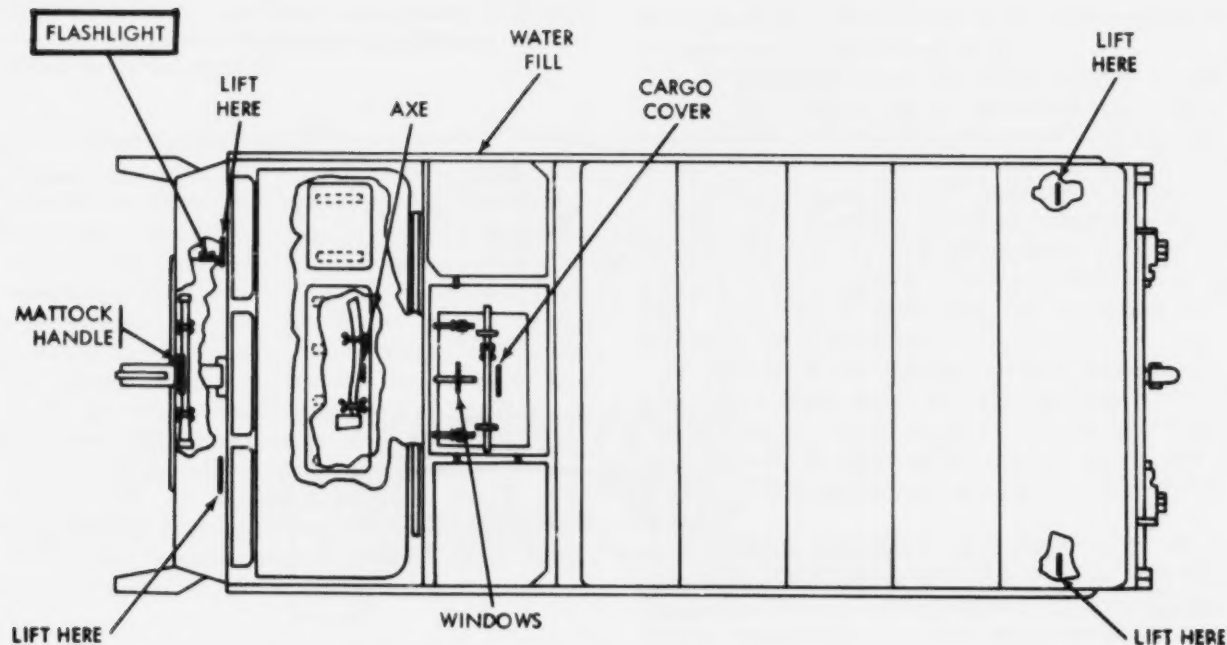
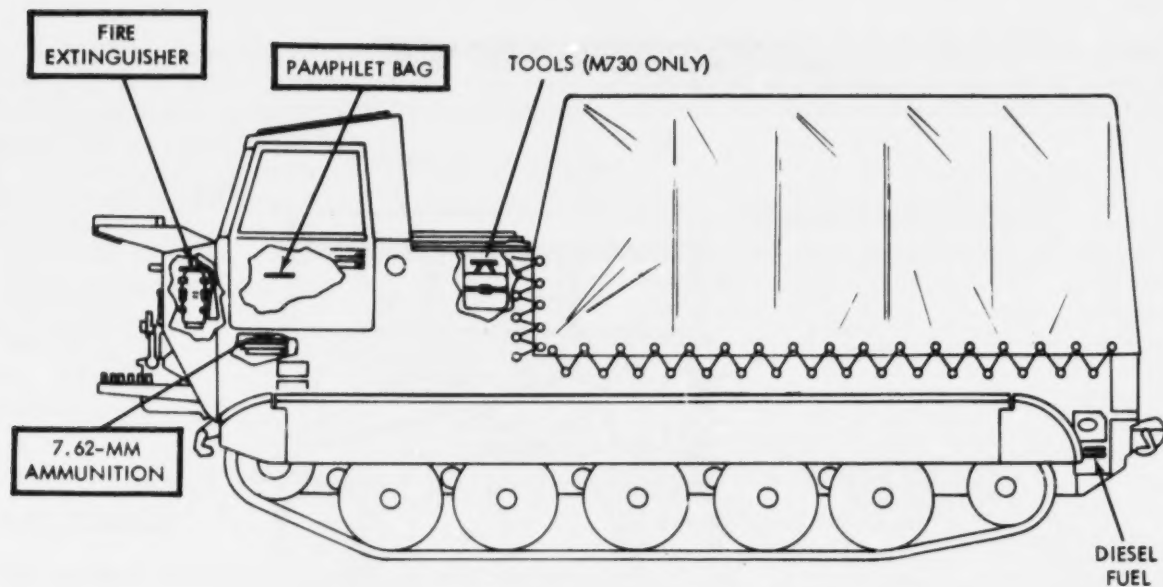
(1) Report unsatisfactory performance of prescribed petroleum fuels, lubricants, or preserving materials, using DA Form 2407.

(2) Record lubrication services on DA Form 2408-1 (Daily) in log book.

2-11. Painting

a. General instructions are included in TM 43-0139, AR 746-1, and TB 43-0209.

b. Equipment location and carrier instruction stencils and decals must be renewed periodically because of weathering or carrier repainting. See figure 2-3 for location of standard stencils and stowage decals on the carrier. Spot painting and marking (stenciling) of tactical carrier will be performed under the control of organizational maintenance personnel.

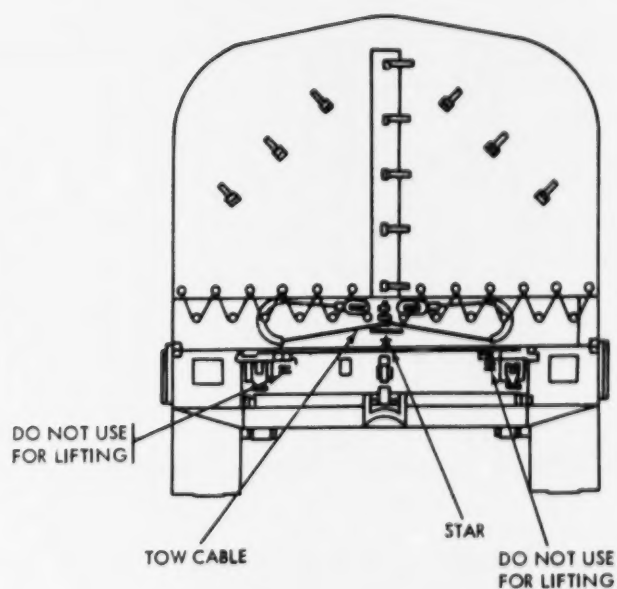
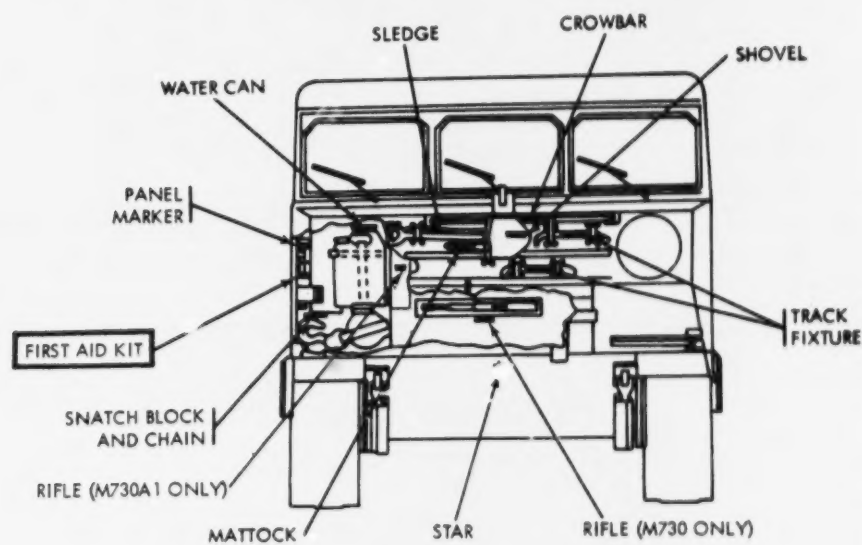


NOTE: SIGNS OUTLINED WITH BOXES ON THE CHART ARE DECALS APPLIED IN LOCATIONS SHOWN TO READ FROM ANGLE SHOWN. SIGNS NOT OUTLINED WITH BOXES ARE STENCILS.

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Figure 2-3. Stencils and decals (sheet 1 of 2).

NOTE: SIGNS OUTLINED WITH BOXES ON THE CHART ARE DECALS APPLIED IN LOCATIONS SHOWN TO READ FROM ANGLE SHOWN. SIGNS NOT OUTLINED WITH BOXES ARE STENCILS.



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Figure 2-3. Stencils and decals (sheet 2 of 2).

c. Marking (stenciling) procedures consist of applying black paint on forest green background. Marking letters should be 1/2 inch high and 3/32 inch wide with 1/4 inch between letters.

d. Painting of a complete tactical carrier can be authorized and performed only by direct support or higher maintenance categories.

e. Refer to Chaparral Aerial Intercept Guided Missile System XM48 organizational maintenance

manual (TM 9-1410-585-series) for touch-up of blast cover, blast cover support channel, blast cover frame, and blast shield protective (ablativ) coating.

2-11.1. Noise Caution Markers

See figure 2-194.1 for locations of noise caution markers.

Section IV. PREVENTIVE-MAINTENANCE SERVICES

2-12. General

This section contains the procedures and instructions necessary to perform quarterly "Q" preventive-maintenance services. These organizational services are performed by organizational maintenance personnel with the assistance of carrier crews every 75 hours, 750 miles, or quarterly, whichever occurs first. Armament, sighting materiel, and basic issue items (BII) will be given preventive-maintenance services concurrently with the carrier.

2-13. Recording Repairs

Repairs accomplished will be in accordance with procedures and standards prescribed in appropriate technical manuals. The equipment record system provides for recording repairs required and accomplished on specific items of equipment. This will include, but is not limited to, adjusting, cleaning, replacing, and straightening. Deficiencies and shortcomings not corrected by operator and crew, or those discovered during periodic inspections, will be corrected as far as possible by organizational maintenance personnel. These repairs will be indicated on DA Form 2404 (Equipment Inspection and Maintenance Work Sheet) and recorded on the organizational maintenance record of the equipment log.

2-14. General Procedures

a. *Automatically Applied.* All of the general procedures given in the operator's manual will be followed. Organizational mechanics must be so thoroughly trained in these procedures that they apply them automatically at all times in the performance of their duties.

b. *Operator and Crew Participation.* The driver or crew usually accompanies the carrier and assists the organizational mechanics in the performance of organizational periodic services.

c. *Unwashed Carrier.* The driver or crew should present the carrier for a scheduled preventive-maintenance service in a reasonably clean condition; that is, it should be dry and not caked with mud to such an extent as to seriously hamper inspection and services. However, washing of the carrier should be avoided immediately prior to an inspection, since certain types of defects such as loose parts and oil leaks may not be evident immediately after washing.

d. *Plates.* Name plates, caution plates, and instruction plates made of steel rust very rapidly. When they are found to be in a rusty condition, they should be thoroughly cleaned and heavily coated with an application of lacquer. Refer to TM 9-213.

e. *Services.* Organizational maintenance services are defined by, and restricted to, the following general procedures unless approval has been given by the supporting ordnance organization.

- (1) *Inspect.* To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.
- (2) *Test.* To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
- (3) *Service.* To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.
- (4) *Adjust.* To rectify to the extent necessary to bring into proper operating range.
- (5) *Align.* To adjust specified variable elements of an item to bring to optimum performance.
- (6) *Calibrate.* To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standards.
- (7) *Install.* To set up for use in an operational environment such as an emplacement, site, or vehicle.
- (8) *Replace.* To replace unserviceable items with serviceable items.
- (9) *Repair.* Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage of a specific failure. Repair may be accomplished at each category of maintenance.
- (10) *Overhaul.* Consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.
- (11) *Rebuild.* The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations of other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

(12) *Modification work order application.* The using organization will enter on DA Form 2408-5 (Equipment Modification Record) all required modification work orders (MWO) applicable to the equipment upon receipt of the official MWO, regardless of the echelon responsible for applying the modification.

f. Special Conditions. When conditions make it difficult to perform the complete preventive-maintenance procedures at one time, they can sometimes be handled in sections. Plan to complete all operations within the week, if possible. All available time at halts and in bivouac areas must be utilized, if necessary, to assure that maintenance operations are completed.

2-15. Specific Procedures of Organizational Maintenance

a. General. Specific procedures for organizational maintenance are the "Q" preventive-maintenance services which insure the correct adjustment, securing, and assembly of all components of the carrier. Necessary replacements, cleaning, lubrication, and protection of parts and/or assemblies will be accomplished, as required, to give reasonable assurance of trouble-free operation until the next preventive-maintenance service is performed. To insure the complete maintenance of the carrier, many procedures which are normal operator and crew functions are also included in the "Q" services because of varying conditions, such as climatic, terrain, and changing assignments of personnel. DA Form 2404 is utilized by the organizational mechanic to record periodic inspections and maintenance services performed, faults corrected, and faults beyond the authorization of the particular maintenance level to correct. The item

numbers recorded on DA Form 2404 must correspond to the sequence numbers on the preventive-maintenance checks and services for the carrier.

b. Carrier. The preventive-maintenance checks and services for the carrier are listed in table 2-2 as sequence numbers 1 through 35. Detailed procedures to be followed and certain specific items to be checked are included for each item.

c. Inspection and Road Test. The driver of the carrier is often unaware of defects that have developed gradually in the carrier. It is, therefore, desirable for organizational maintenance personnel to road test the carrier as part of the quarterly preventive-maintenance service, performing the inspection and road test specified in table 2-2 as sequence numbers 36 through 41. During and after the road test of the carrier, any repairs or adjustments necessary to insure safe operation should be made. Any defect of any item that does not require immediate correction should be noted on DA Form 2404. The defect should be corrected later during the after-road-test services. When the tactical situation does not permit a complete road test, perform only those checks that require little or no movement of the carrier. When a road test can be performed, the distance should be approximately 3 but not over 5 miles. When conditions prevent a road test, apply parking brake, and perform the engine idle test and governed no-load test as specified below.

(1) *Idle test.* Run engine at high idle (1000 to 1100 rpm) until normal operating temperature (160° to 200°F.) is reached. With transmission in neutral, engine should idle smoothly at 550 to 600 rpm. High or low engine idle speed is usually caused by throttle linkage being out of adjustment. Rough engine idling usually results from faulty injector timing and rack setting, defective fuel injectors, air induction system, or plugged fuel filters.

CAUTION

Avoid prolonged engine idling at 550 to 600 rpm. This causes coolant temperature to drop below operating temperature and is detrimental to the life of the engine. Engine should be run at 1,000 to 1,200 rpm under no-load conditions for prolonged idle.

(2) *Governed no-load test.* Run engine until normal operating temperature is reached. With transmission in neutral, gradually open throttle until accelerator is fully depressed. Engine speed will generally exceed 3,000 rpm momentarily, then stabilize at 2,925 to 2,975 rpm. If governor repeatedly cuts in and out or surges at this speed, adjustments are required; notify direct support maintenance personnel.

CAUTION

Engine speed must not be permitted to exceed 3,000 rpm for more than 2 or 3 seconds in the event of governor malfunction.

(3) *Stall test.* Perform stall test when there is doubt that power plant is producing maximum power, and to determine whether engine or transmission is at fault.

(a) Check engine and transmission oil levels (LO 9-1450-585-12).

(b) Operate engine and transmission until normal operating temperature is reached on the engine coolant temperature indicator.

(c) Apply and lock brakes.

(d) Place transmission range selector in 2-3 range.

(e) Set engine throttle for maximum rpm.

CAUTION

Limit stall test to 30 seconds. Lengthy full throttle operation with brakes locked creates high oil temperatures and will damage engine and transmission.

(f) Observe tachometer reading. A reading of 1,900 to 2,100 rpm indicates engine and transmission are both operating correctly.

NOTE

Extreme high air temperature and high altitude will lower stall speed.

(g) If tachometer reading is below 1,900 rpm, engine is at fault. Notify direct support maintenance personnel.

(h) If tachometer reading is above 2,100 rpm, transmission is at fault. Notify direct support maintenance personnel.

d. After-Road-Test Services.

(1) *Maintenance services.* Perform after-road-test services listed in table 2-2 as sequence numbers 42 through 46. Correct any defects noted during road-test and inspection.

(2) *Lubrication.* Inspect and lubricate, if necessary, in accordance with LO 9-1450-585-12. If the carrier is receiving a 1,000 mile service at this time, record the lubrication interval on DD Form 314 (Preventive-Maintenance Schedule and Record).

(3) *Final road test.* After all services and inspections on the carrier have been completed, take carrier on a short road test to insure that operational difficulties have been corrected. Pay particular attention to those items found defective initially. Correct any remaining problems noted during this test run.

Table 2-2. Preventive Maintenance Checks and Services

Organizational		M730 and M730A1 Guided Missile Equipment Carrier	Quarterly Schedule
Sequence number	Item to be inspected	Procedures	Paragraph reference
1	Lubrication	Lubricate carrier. NOTE Lubrication should be performed in sequence and in conjunction with checks and services listed below. Check engine and transmission oil levels and coolant level prior to first check that requires engine operation.	LO 9-1450-585-12
2	Track shrouds, clamps, and covers	Replace torn shrouds and missing hardware. Repair bent shroud clamps.	Para 2-183 and 2-184.
3	Wheels — road wheels and idler wheels.	Replace wheels that show evidence of rubber separation or if damage to road wheel is sufficient to cause thumping during use. Tighten loose road wheel and idler wheel retaining nuts to 150 to 170 pound-feet torque. NOTE When directions state to tighten all loose nuts/bolts to a specified torque value, this implies that a torque wrench will be used to check every (all) nut/bolt and not just the obviously loose ones.	Para 2-193 and 2-196.
4	Arms and hubs	Replace seals and/or gaskets where leaks are evident. At each second Quarterly service or whenever track is removed, adjust wheel bearings if looseness or end play is evident.	Para 2-193 and 2-194.
5	Shock absorbers and bumpers	Replace shock absorbers that have severe fluid leaks or loose-fitting bearings. Replace bumpers that have gouges, chips, and cuts sufficient to allow road wheel arm to hit support.	Para 2-185 and 2-201.
6	Torsion bars	Pry up each road wheel to detect broken torsion bars. Broken front torsion bars may be detected by absence of sharp angle of track as it passes under road wheel. Check if torsion bar plugs are fully seated and retaining screws are in place and secure.	Para 2-197 and 2-198.
7	Sprocket and cushion	Gage sprocket teeth for wear, using gage 5120-01-041-9920. Edge contour of sprocket must extend beyond edge of gage. If edge of sprocket tooth falls behind gage at any point, sprocket must be replaced or reversed. Tighten drive sprocket cap screws to 110 to 115 pound-feet torque. Replace sprocket cushions if gouges, chips, and cuts are sufficient to cause thumping.	Para 2-188.
8	Tracks	Replace damaged or excessively worn track shoes and pins. Tighten loose track pin retaining outboard nut to 120 to 130 pound-feet torque. Replace missing, damaged, or worn track pads. Tighten loose track pad retaining nuts to 135 to 150 pound-feet torque. NOTE Carrier might have either T130 or T130E1 track shoes. T130 pad is about 5-1/4 in. long and T130E1 is about 4-3/4 in. long. CAUTION Tracks are not to be mixed on either side of carrier.	Para 2-182.

Table 2-2. Preventive Maintenance Checks and Services — Continued

Organizational		M730 and M730A1 Guided Missile Equipment Carrier		Quarterly Schedule
Sequence number	Item to be inspected	Procedures		Paragraph reference
9	Track tension and track adjuster . . .	Replace adjuster if grease leaking is evident. Move carrier to level, hard-surfaced ground and allow it to coast to a stop without applying the brakes. With the track touching the top of the third road wheel measure distance between bottom of track and top of second road wheel using gage 5120-01-041-9920. This measurement must be 1/2 inch or larger for M730A1.		Para 2-189.
10	Access covers	Secure or replace loose or missing access covers and drain plates on underside of hull. Replace gaskets that show resiliency loss, cracks, or breaks.		Para 2-223.
11	Tailgate and cab doors	Check doors and tailgate for ease of movement, damaged seals, and general condition. Tighten loose hardware, and check adjustments for watertight fit. Adjust if required.		Para 2-216 through 2-220.
12	Towing pintle, tow hooks	Replace missing or damaged retaining pins and keys. Check if towing pintle is securely mounted and operates satisfactorily.		Para 2-234 through 2-236.
13	Lights — headlights, taillights, stop lights, infrared lights, and blackout lights	Test operation of lights: To check infrared lamps, turn on and place hand on lens. Heat will be felt if operating properly. Secure, repair, or replace as required, broken, cracked, and discolored lenses or lamps.		Para 2-120 through 2-125.
		NOTE Test lights only if tactical situation permits.		
14	Cab and rear compartment covers . .	Check covers for tears, loose straps, broken ropes, and damaged grommets. Replace broken rope. Replace covers that are damaged.		TM 9-1450-585-10 and Para 2-251.
15	Cooling system radiator hoses and belts.	Replace cracked or broken hoses and worn fan and coolant pump drive-belts. Check radiator and coolant pump for leaks. Replace as required. Tighten hose clamps and mounting bolts. Adjust fan drive-belts. Check coolant level.		Para 2-81 through 2-87.
16	Air cleaner and hoses	Clean air cleaner element after operation in dust or sand. Remove air cleaner element from its case and use 15 psi compressed air to clean element as follows: Blow dirt off inside of element. Blow dirt off outside of fins. Blow dirt off inside of element again. The element can be washed with soap and water. Rinse in clear water and dry thoroughly. Never use gasoline or other solvents to clean element. For emergency cleaning, gently tap fins with hand, then remove loosened dirt by tapping sides gently. Do not strike ends. Replace element and hose if torn or ruptured. CAUTION Operation with dirty or improper air cleaner element can cause severe engine damage due to overheating and abrasive action. Make sure element is clean, properly installed, and matches the air cleaner assembly.		Para 2-72 through 2-74.
				Para. 2-73 and TM 9-1450-585-10.

Table 2-2. Preventive Maintenance Checks and Services — Continued

Organizational		M730 and M730A1 Guided Missile Equipment Carrier	Quarterly Schedule
Sequence number	Item to be inspected	Procedures	Paragraph reference
17	Final drives and universal joints	Replace worn universal joints and leaking final drive seals. Tighten loose 6C universal joint screws 35 to 40 pound-feet torque. Loosen and retighten screws to 35 to 40 pound-feet torque. Tighten 7C universal joint screws 86 to 94 pound-feet torque. Loosen and retighten screws 86 to 94 pound-feet torque. Tighten final drive to hull mounting cap screws to 75 to 85 pound-feet torque. NOTE Always replace universal joint screws after removing or replacing universal joints or propeller shafts.	Para 2-174 through 2-176.
18	Oil levels of engine, transmission, differential, transfer gearcase and final drive.	Before starting engine, check that engine oil level is between L and F marks on gage rod, and transmission and differential have sufficient oil for operation. ENGINE Place carrier on comparatively level ground. Start and operate engine until operating temperature (160 to 200°F.) is reached. Stop engine and wait 3 to 5 minutes, then check oil level and add oil as required to bring between L and F marks on gage rod. TRANSMISSION Start and operate engine at 800-1000 rpm for 3 to 5 minutes with shaft lever in 2-3 position and brakes locked. Return shift lever to N, and check transmission oil level with engine operating at 1,500 rpm. Add oil as required to bring level between ADD and FULL marks on gage rod. DIFFERENTIAL Check oil level with engine stopped and cold. Oil should be between ADD and FULL marks. Add oil as required. TRANSFER GEARCASE Add oil as required to bring level to FULL mark on gage rod. NOTE If engine, transmission, transfer gearcase, and differential are scheduled for oil change, drain when hot (after operation). The hard-time interval for oil change of the engine, transmission, transfer gearcase, and differential is six months. If Army Oil Analysis Program (AOAP) service is available oil is to be changed only as indicated by the AOAP report. FINAL DRIVE Add oil as required to bring level between ADD and FULL marks on gage rod.	LO 9-1450-585-12
19	Transmission, differential, transfer gearcase.	Tighten loose mounting bolts. Repair and/or adjust (as required) shifting and steering linkage that is bent or improperly adjusted. Check for oil leaks. Replace hoses that are damaged, worn, or that leak.	Para 2-152, 2-153, 2-158, 2-159, 2-162, 2-165, and 2-203.

Table 2-2. Preventive Maintenance Checks and Services — Continued

Organizational		M730 and M730A1 Guided Missile Equipment Carrier	Quarterly Schedule
Sequence number	Item to be inspected	Procedures	Paragraph reference
20	Oil filter	Replace engine oil filter at 750 miles, 75 hour intervals, or quarterly.	LO 9-1450-585-12.
21	Fuel filters	Replace engine fuel filters at 750 miles, 75 hour intervals, or quarterly.	LO 9-1450-585-12.
22	Engine, generators, drivebelts, and starter.	Tighten loose connections and mounting bolts. Adjust generator drivebelts if marker on gage does not indicate in operating range. Clean air box collector can and element. Start engine, and check that starter operates without excessive noise and develops adequate cranking speed. Listen for unusual noises in engine and components that might indicate improper operation or lack of lubrication.	Para 2-32, 2-105, and 2-106.
23	Exhaust system	Replace exhaust system components that show evidence of deterioration or holes. Tighten connections and clamps if there is indication of exhaust leaks.	Para 2-76 and 2-78.
24	Fuel system	Tighten connections that show evidence of leaks. Check operation of air inlet valve at fuel tank (if accessible). Clean screen in fuel tank filler neck. Check fuel tank drain plug. Check air separator tank. Check air box heater fuel system.	Para 2-44 through 2-47; 2-52 through 2-60 2-62, 2-63, 2-65, 2-66, 2-68 through 2-70.
25	Bilge pumps	Clean debris from bilge pump protective wiremesh screen. Tighten loose hose clamps and mounting screws. Check operation of bilge pumps.	Para 2-139.
26	Batteries	Clean batteries and box; if corroded, paint box and cover with acid-resistant paint. Replace batteries that have leaks or cracked cases. Remove caps and clean vents. Test specific gravity with hydrometer. Add water to bring to proper level. Clean cable terminals, bolts, and post. Tighten terminals and holddown bolts carefully to avoid damage to batteries, then grease terminals lightly.	Para 2-98.
27	Electrical wiring, interior lights and switches.	Tighten electrical connections, radio suppression straps, and component mounting bracket screws. Tape frayed harness, and replace missing or defective chassis grommets and connections. Secure, repair, or replace lights and switches that are insecurely mounted, inoperative, or damaged.	Para 2-145 through 2-151 and fig. 2-92.
28	Winch and winch cable	Check oil level in winch. Check brake adjustments. Inspect winch cable.	Para 2-242 and 2-244.
29	Winch transfer gearcase	Check transfer gearcase for leaks and damage. Clean breather.	Para 2-245 and 2-249.
30	Winch power takeoff	Check power takeoff for leaks and damage	Para 2-248.
31	Fire extinguisher	WARNING Handle charged fire cylinders with care. Weigh portable fire extinguisher. Replace seal if damaged or broken. Inspect discharge nozzle and actuating trigger for serviceability. Remove and weigh fixed fire extinguisher cylinder. Cylinder must be replaced if weight loss exceeds 10 percent of difference between full and empty weight marked on cylinder. With cylinder removed, operate discharge handles to insure cables and controls function properly. Replace wire seals.	Para 2-265 through 2-268.

Table 2-2. Preventive Maintenance Checks and Services — Continued

Organizational		M730 and M730A1 Guided Missile Equipment Carrier	Quarterly Schedule
Sequence number	Item to be inspected	Procedures	Paragraph reference
32	Driver's and personnel seats	Repair or replace cushions that are torn, snagged, or excessively worn. Check adjusting mechanisms and trip lever of seats for smooth operation. Replace missing or damaged hardware.	Para 2-227 through 2-229.
33	Seat safety belts and straps	Replace worn seat safety belts or broken straps.	Para 2-228 and 2-230 and fig. 2-165.
34	Windshield wiper blades, arms, and motor.	Check blade and arm for proper adjustment. Adjust blade and arm if required. Check blade and arm for breaks and excessive wear. Replace damaged or worn blade or arm. Check motor for damage and malfunction. Replace malfunctioning motor.	Para 2-253 and 2-255.
35	Throttle and accelerator controls, linkage, neutral start switch, and fuel cut-off control.	Check neutral start switch adjustment. Start engine; allow to warm up for several minutes. Check for smooth operation of throttle and accelerator controls. When shutting down engine, check operation of fuel cutoff control. WARNING Danger, monoxide gas: Secure power plant access panels before starting engine. ROAD TEST Road test should be approximately 3 to 5 miles. When conditions prevent a road test, perform engine idle, governed no-load test, and stall check.	Para 2-115 and 2-211 through 2-213.
36	Winch power takeoff	Check power takeoff control for ease of operation and proper adjustment. Adjust as required.	Para 2-15.
37	Pivot steering and reservoirs.	Operate pivot steering levers one at a time, and check for carrier pivot. Check fluid level in reservoirs, and add fluid as required.	Para 2-248.
38	Instruments, gages, indicator lights, and warning lights.	Tighten loose electrical connections and mountings. Repair or replace broken or inoperative gages, instruments, indicator lights, and warning lights. Check instruments, gages, indicator lights, and warning lights for normal indications. a. Engine coolant temperature indicator should show 160° to 200°F during operation. CAUTION Do not allow engine to operate for sustained periods if coolant temperature indicator indicates above 200°F as serious damage to engine may result. NOTE The warning lights are normally off during operation. b. Differential oil high temperature warning light should not come on. c. Transmission oil high temperature warning light should not come on. d. Engine oil low pressure warning light should come on when engine oil pressure is below 9 to 13 psi (4 to 8 psi on later models). e. Tachometer and speedometer should operate without excessive fluctuation or unusual noises.	Para 2-204 and 2-205. Para 2-92. TM 9-1450-585-10.

Table 2-2. Preventive Maintenance Checks and Services — Continued

Organizational		M730 and M730A1 Guided Missile Equipment Carrier	Quarterly Schedule
Sequence number	Item to be inspected	Procedures	Paragraph reference
39	Differential steering and brakes	Operate steering levers, and check for satisfactory steering response. With carrier operating on level surface at moderate speed and steering levers released, check for any tendency to wander or pull to one side. Release accelerator pedal, and apply brakes; check if carrier stops effectively without pulling to one side. With carrier stopped on an incline, pull back on both steering levers, depress lock buttons, and move transmission shift lever to N (neutral) position. Check whether brakes lock securely and carrier is held in place.	Para 2-203.
40	Transmission	Shift through full range of transmission to see that linkage does not bind, and that carrier responds satisfactorily. Examine all visible controls for correct adjustment and for any restriction or binding of action.	Para 2-213.
41	Engine governed speed and performance.	Test engine for normal acceleration and power in each transmission range. While testing in low range, accelerate with wide-open throttle from low speed to top speed. Listen for unusual noises or vibrations that might indicate loose, damaged, or excessively worn parts, or loose mountings.	TM 9-1450-585-10.
		CAUTION Do not operate air pump without engaging engine starter.	
41.1	Air pump (air box heater)	Run the pump monthly for 5 to 10 seconds. Disconnect lead to ignition coil before running pump.	
42	Temperature of wheel hubs and shock absorbers.	AFTER ROAD TEST Immediately after road test, cautiously feel all wheel hubs for noticeable variation of temperature between like components. An overheated hub indicates a maladjusted, inadequately lubricated, or damaged bearing. Shock absorbers should feel warmer than hull. Cold shock absorbers indicate a failed shock absorber.	TM 9-1450-585-10.
43	Leaks	Visually inspect inside and outside of carrier for evidence of fuel or oil leaks. Correct deficiencies noted.	TM 9-1450-585-10.
44	Decals, instruction plates, stencil markings and paint.	Replace decals, instruction plates, and stencil markings that are not legible. Clean and paint bare spots in the painted surface that might permit reflection, rust, or corrosion.	
45	Modification	Check vehicle DA Form 2408-5 to determine if all modifications have been accomplished. A current list of Modification Work Orders is contained in DA Pamphlet 310-7.	
46	Final road test.	After all services and inspections have been completed, take carrier on a short road test to insure correction of operational deficiencies. Pay particular attention to those items that were initially defective.	TM 9-1450-585-10.
		NOTE Refer to table 3-2 for preventive-maintenance procedures covering the personnel heater and to table 3-9 for procedures covering the engine coolant heater.	

Section V. TROUBLESHOOTING THE CARRIER

2-16. Scope

a. This section contains troubleshooting information and tests for locating and correcting some of the troubles which may develop in the carrier. Each symptom of trouble or malfunction given for an individual unit or system is followed by a list of probable causes of the trouble and corrective actions necessary to remedy the malfunction.

b. This technical manual cannot cover all possible troubles and deficiencies that may occur under the many conditions of operation. If a specific trouble, test, and remedy are not covered herein, proceed to isolate the system in which the trouble occurs and then locate the defective component. Use all the senses to observe and to locate troubles. Do not neglect use of any test instruments such as an ohmmeter, voltmeter, ammeter, test lamp, hydrometer, and pressure and

vacuum gages that are available. Standard automotive theories and principles of operation apply in troubleshooting the carrier. Question carrier crew to obtain maximum number of observed symptoms. The greater the number of symptoms of troubles that can be evaluated, the easier will be the isolation of the defect.

2-17. Specific Procedures for Troubleshooting

Specific procedures for troubleshooting are listed in table 2-3 as possible malfunctions, probable causes, and corrective action that can be performed by organizational maintenance personnel. Probable causes are listed in their order of probability and should be checked in that order during troubleshooting. Refer to TM 9-1450-585-10 for operational troubleshooting.

Table 2-3. Carrier Troubleshooting

Malfunction	Probable Cause	Corrective Action
	ENGINE	
1. Engine fails to crank when starter switch is held on.	a. Malfunction in starting or battery system. b. Mechanical seizure of engine parts. c. Mechanical seizure of transfer gearcase or transmission. d. Starter drive pinion nut engaging with flywheel ring gear.	a. Check electrical connections on starting system components (para 2-112). If above does not remedy malfunction, troubleshoot circuit (para 2-22). b. Notify direct support maintenance personnel. c. Notify direct support maintenance personnel. d. Remove starter (para 2-113 a) and inspect drive pinion for damage. If drive pinion is damaged, replace starter. If flywheel ring gear is damaged, notify direct support maintenance personnel.
2. Engine cranks but fails to start.	a. Improper or contaminated fuel in fuel compartment. b. Defective fuel or air intake system. c. Defective air box heater d. Incorrect injector or rack timing. e. Internal engine malfunction	a. Refer to item 11 below. b. Refer to item 11 below. c. Refer to item 17 below. d. Notify direct support maintenance personnel. e. Notify direct support maintenance personnel.
3. Engine oil low pressure warning light comes on.	a. External oil leaks b. Defective indicator light, switch, or electrical circuit.	a. Tighten hoses and fittings. If leaks persist, replace defective hoses and fittings and apply sealing compound (para 2-36). b. Replace indicator light (para 2-93) or oil low pressure switch (para 2-132). If above does not remedy malfunction, troubleshoot circuit (para 2-24).

CAUTION

Do not operate engine with indicator light on. Serious damage may occur.

Table 2-3. Carrier Troubleshooting—Continued

Malfunction	Probable Cause	Corrective Action
	ENGINE—Continued	
3. Continued	c. Defective engine oil cooler	c. Remove and inspect oil cooler (para 2-42). Replace oil cooler if defective.
	d. Defective engine lubrication system.	d. Notify direct support maintenance personnel.
4. Engine overheats as indicated by engine coolant temperature indicator.	a. Defective cooling or air circulating system.	a. Refer to item 19 below.
	b. Defective indicator, transmitter, or electrical circuit.	b. Replace engine coolant temperature indicator (para 2-136) or transmitter (para 2-183). If above does not remedy malfunction, troubleshoot circuit (para 2-24).
	c. Exhaust valves out of adjustment.	c. Notify direct support maintenance personnel.
5. Engine overcools as indicated by engine coolant temperature indicator.	a. Defective thermostat	a. Refer to item 20 below.
	b. Defective indicator, transmitter, or electrical circuit.	b. Refer to item 4 above.
6. Engine fails to develop full power.	a. Improper or contaminated fuel in fuel compartment.	a. Refer to item 11 below.
	b. Defective exhaust, fuel, or air intake system.	b. Refer to item 13 below.
7. Engine runs unevenly or stalls frequently.	Defective fuel or air intake system.	Refer to item 13 below.
8. Engine oil consumption excessive.	a. Leaking oil hoses or connections.	a. Tighten hoses and fittings. If leaks persist, replace defective hoses and fittings (para 2-36).
	b. Leaking gaskets or oil seals.	b. Notify direct support maintenance personnel.
	c. Restricted crankcase ventilating system.	c. Remove and clean crankcase breather collector can (para 2-38). Replace can if defective.
	d. Restricted air box vent	d. Check air box drain tubes (para 2-37).
	e. Internal engine malfunction	e. Notify direct support maintenance personnel.
9. Excessive crankcase pressure.	a. Restricted crankcase ventilating system.	a. Remove and clean crankcase breather collector can (para 2-38). Replace can if defective.
	b. Restricted muffler or exhaust pipe.	b. Replace muffler (para 2-78), or remove exhaust pipe (para 2-76) and clean or replace.
	Internal engine malfunction	c. Notify direct support maintenance personnel.
10. Engine starts and then stops.	Clogged air intake valve in fuel system causing vacuum in fuel compartment.	Replace air intake valve (6, fig. 2-40).
	FUEL, AIR INTAKE, AND EXHAUST SYSTEMS	
11. Engine cranks but fails to start.	a. Leaking fuel lines or connections.	a. Tighten connections. If fuel leaks persist, replace fuel lines (paras 2-54 and 2-55).
	b. Restricted fuel lines	b. Disconnect fuel lines (paras 2-54 and 2-55), and clean with compressed air. If air does not pass through lines freely, replace lines.
	c. Low electric fuel pump output pressure.	Check electric fuel pump output pressure (para 2-24 or 2-49). If pump pressure is low, replace fuel pump (para 2-48 or 2-49).

Table 2-3. Carrier Troubleshooting - Continued

Malfunction	Probable Cause	Corrective Action
11. Continued	FUEL, AIR INTAKE, AND EXHAUST SYSTEMS—Continued d. Loose electrical connections or defective fuel electrical circuit. e. Restricted primary or secondary fuel filter. f. Defective engine fuel pump g. Contaminated or incorrect fuel in fuel compartment. h. Fuel cutoff control not properly adjusted. i. Restricted air cleaner j. Defective blower k. Internal engine malfunction	d. Check electrical connections at fuel pump, main wiring harness, and fuel pump switch. If above does not remedy malfunction, troubleshoot circuit (para 2-25). e. Remove and clean restricted primary or secondary fuel filter (para 2-56 or 2-57), or replace restricted filter element (para 2-58). f. Check fuel flow from fuel return line (para 2-45a). Replace pump if defective. g. Drain and refill fuel compartment with correct fuel (para 2-62). Drain air separator tank (para 2-46). Replace contaminated filter element (para 2-58). h. Check and adjust fuel cutoff control (para 2-212a). i. Check air cleaner and hoses for restrictions. Replace air cleaner element if restricted (para 2-73), and clean hoses. j. With fuel cutoff pulled out and air inlet hose removed, check operation of blower. If blower fails to operate, notify direct support maintenance personnel. k. Notify direct support maintenance personnel. Replace air intake valve (6, fig. 2-40).
12. Engine starts and then stops.	Clogged air intake valve in fuel system causing vacuum in fuel compartment.	
13. Engine fails to develop full power.	a. Restricted air cleaner element. b. Exhaust valves not properly adjusted. c. Throttle not properly adjusted. d. Faulty injectors or incorrect injector and rack timing. e. Incorrect governor adjustment f. Restricted fuel return line g. Restricted primary or secondary fuel filter element. h. Internal engine malfunction	a. Service air cleaner element (para 2-73). Replace if restricted. b. Notify direct support maintenance personnel. c. Check and adjust accelerator pedal linkage (para 2-211). d. Notify direct support maintenance personnel. e. Notify direct support maintenance personnel. f. Check fuel flow through fuel return line (20, fig. 2-41). Replace line if restricted (para 2-55). g. Replace fuel filter element (para 2-58). h. Notify direct support maintenance personnel.
14. Engine runs unevenly or stalls frequently.	a. Defective injector b. Incorrect injector and rack timing. c. Incorrect governor adjustment d. Internal engine malfunction	a. Notify direct support maintenance personnel. b. Notify direct support maintenance personnel. c. Notify direct support maintenance personnel. d. Notify direct support maintenance personnel.
15. Fuel consumption excessive.	Leaking fuel lines or connections.	Check fuel lines, fuel pump, primary and secondary fuel filters, and fuel compartment for fuel leaks. Tighten lines and replace gaskets if necessary.
16. Fuel quantity indicator fails to register when master switch is turned on, although fuel compartment holds known quantity of fuel.	Loose electrical connections or defective transmitter or fuel quantity indicator.	Check electrical connections at transmitter and fuel quantity indicator (para 2-60 and 2-61). If above does not remedy malfunction, troubleshoot circuit (para 2-25).

Table 2-3. Carrier Troubleshooting - Continued

Malfunction	Probable Cause	Corrective Action
17. Engine cranks but fails to start when air box heater is operated.	FUEL, AIR INTAKE, AND EXHAUST SYSTEMS—Continued	
	a. Accumulator air (early models) or fuel pressure low. b. Defective accumulator pressure indicator (early models). c. Restricted fuel nozzle d. Defective hand pump (early models) e. Defective accumulator (early models) f. Leaking air box fuel lines and connections. g. Loose electrical connections or defective ignitor, ignition coil, or solenoid valve. h. Defective air pump (late models).	a. Pump up accumulator pressure (para 2-63b). b. Replace accumulator pressure indicator (para 2-65). c. Remove and clean fuel nozzle (para 2-70). Replace nozzle if defective. d. Replace hand pump (para 2-66). e. Check nitrogen pressure in accumulator. If accumulator will not hold pressure, replace accumulator (para 2-63). f. Tighten connections. If leaks persist, replace fuel lines (para 2-68). g. Check electrical connections at ignitor, ignition coil, and solenoid valve (para 2-25). If above does not remedy malfunction, troubleshoot circuit (para 2-25). h. Check hose and electrical connections on pump. If they are secure, replace air pump or vanes in pump (para 2-66.1).
18. Engine noise excessive or fumes in cab.	a. Defective exhaust crossover pipes b. Leaking exhaust manifold gaskets c. Defective exhaust muffler d. Defective exhaust manifold	a. Replace crossover pipes (para 2-76). b. Replace manifold gaskets (para 2-43). c. Replace muffler (para 2-78). d. Replace manifold (para 2-43).
	COOLING SYSTEM	
19. Engine overheats as indicated by engine coolant temperature indicator.	a. Defective coolant temperature transmitter, indicator light, or electrical circuit. b. Leaking coolant hoses, tubes or fittings. c. Excessive dirt, oily film, or other foreign material on radiator fins. d. Restricted cooling system e. Loose or defective fan drive-belts. f. Loose or defective coolant pump drive-belts. g. Defective cooling fan h. Defective thermostat i. Defective radiator mounting seals j. Defective coolant pump k. Defective pressure valve in radiator cap.	a. Check electrical connections on transmitter, indicator, and bulkhead connector (para 2-24). If above does not remedy malfunction, troubleshoot circuit (para 2-24). b. Tighten coolant hoses, tubes, and fittings. Replace defective hoses, tubes, or fittings (para 2-86). c. Clean radiator fins with special radiator cleaning tool (para 2-87). d. Test cooling system to determine cause (TM 750-254). Replace radiator if defective (para 2-87). e. Adjust or replace fan drive-belts (para 2-85). f. Adjust or replace coolant pump drive-belts (para 2-81). g. Replace cooling fan (para 2-88). h. Remove and test thermostat. Replace if defective (para 2-84). i. Replace seals (para 2-87). j. Replace coolant pump (para 2-83). k. Replace radiator cap.

Table 2-3. Carrier Troubleshooting—Continued

Malfunction	Probable Cause	Corrective Action
	COOLING SYSTEM—Continued	
20. Engine overcools as indicated by engine coolant temperature indicator.	a. Defective coolant temperature transmitter, indicator, or electrical circuit.	a. Check electrical connections on transmitter, indicator, and bulkhead connector (para 2-24). If above does not remedy malfunction, troubleshoot circuit (para 2-24).
	b. Defective thermostat	b. Remove and test thermostat. Replace if defective (para 2-84).
	BATTERY AND GENERATING SYSTEM	
21. Master switch on indicator fails to come on when master switch is turned on.	Loose electrical connections or defective batteries, indicator light or lamp, or master switch.	Check electrical connections at batteries, indicator light, and master switch (para 2-21). Replace indicator light or lamp if defective (para 2-93).
22. Battery-generator indicator fails to operate with master switch turned on.	Loose electrical connections or defective batteries, battery-generator indicator, or master switch.	Check electrical connections at battery-generator indicator and master switch (para 2-21). If above does not remedy malfunction, troubleshoot circuit (para 2-21).
23. Engine fails to crank when starter switch is held on.	a. Defective starting system	a. Check electrical connections on starter, starter relay, starter switch, neutral start switch, and bulkhead receptacles (para 2-22). If above does not remedy malfunction, troubleshoot circuit (para 2-22).
	b. Defective or discharged batteries	b. Check batteries (para 2-98). Recharge batteries if discharged, or replace if defective.
24. No generator output as indicated by battery-generator indicator.	a. Loose or defective generator drive-belts.	a. Adjust or replace generator drive-belts (para 2-106).
	b. Loose electrical connections; generator-regulator out of adjustment; defective generator field switch, battery-generator indicator, batteries, generator-regulator, rectifier, or circuit breaker.	b. Check electrical connections at batteries, generator, generator field switch, rectifier, generator-regulator, and circuit breaker (para 2-21). If above does not remedy malfunction, troubleshoot circuit (para 2-21).
25. Continuous high or low battery charging rate as indicated by battery-generator indicator.	Generator-regulator out of adjustment or defective battery-generator indicator or batteries.	Troubleshoot battery and generating system (para 2-21).
26. Batteries overheating	Defective battery and generating system.	Troubleshoot battery and generating system (para 2-21).
	STARTING SYSTEM	
27. Engine fails to crank when starter switch is held on.	Loose electrical connections or defective starter, starter switch, neutral start switch, or starter relay.	Check electrical connections on starter, starter switch, neutral start switch, starter relay, and bulkhead receptacles (para 2-22). If above does not remedy malfunction, troubleshoot circuit (para 2-22).
	HORN AND LIGHTING SYSTEM	
28. Horn fails to sound	Loose electrical connections or defective horn or horn switch.	Check electrical connections at horn, horn switch, and bulkhead receptacle (para 2-23). If above does not remedy malfunction, troubleshoot circuit (para 2-23).
29. All instrument panel and carrier electrical components inoperative with carrier master switch on.	Defective battery-generating system	Check electrical connections at batteries, indicator light, and master switch (para 2-21).

Table 2-3. Carrier Troubleshooting—Continued

Malfunction	Probable Cause	Corrective Action
	HORN AND LIGHTING SYSTEM—Continued	
30. Instrument panel light inoperative.	Loose electrical connections or instrument panel ground lead, or defective light, lamp, or main light selector switch.	Check electrical connections on instrument panel light and main light selector switch (para 2-23). Replace lamp if defective. If above does not remedy malfunction, troubleshoot circuit (para 2-23).
31. Service headlight or headlights inoperative on one or both beams.	Loose electrical connections or defective headlight lamp, beam selecting switch, or main light selector switch.	Check electrical connections on headlight, beam selecting switch, main light selector switch, and bulkhead connector (para 2-23). Replace lamp if defective. If above does not remedy malfunction, troubleshoot circuit (para 2-23).
32. Infrared headlight or headlights inoperative on one or both beams.	Loose electrical connections or defective lamp, infrared-blackout selector switch, beam selecting switch, or main light selector switch.	Check electrical connections on headlight, infrared-blackout selector switch, beam selecting switch, and bulkhead connector (para 2-23). Replace lamp if defective. If above does not remedy malfunction, troubleshoot circuit (para 2-23).
33. Blackout headlight or blackout marker lights inoperative.	Loose electrical connections or defective lamp, infrared-blackout selector switch, or main light selector switch.	Check electrical connections on light, infrared-blackout selector switch, main light selector switch, and bulkhead connector (para 2-23). Replace lamp if defective. If above does not remedy malfunction, troubleshoot circuit (para 2-23).
34. Blackout stop light inoperative.	a. Loose electrical connection or defective blackout lamp, stop light, infrared-blackout selector switch, stop light switch, or main light selector switch. b. Stop light switch out of adjustment.	a. Check electrical connections on blackout stop light, infrared-blackout selector switch, stop light switch, and main light selector switch (para 2-23). Replace lamp if defective. If above does not remedy malfunction, troubleshoot circuit (para 2-23). b. Adjust stop light switch (para 2-129).
35. Service stop light inoperative.	a. Loose electrical connections or defective lamp, stop light switch, or main light selector switch. b. Stop light switch out of adjustment.	a. Check electrical connections on service stop light, stop light switch, and main light selector switch (para 2-23). Replace lamp if defective. If above does not remedy malfunction, troubleshoot circuit (para 2-23). b. Adjust stop light switch (para 2-129).
36. High beam indicator inoperative.	Loose electrical connections or defective indicator, beam selecting switch, or main light selector switch.	Check electrical connections on high beam indicator, beam selecting switch, and main light selector switch (para 2-23). If above does not remedy malfunction, troubleshoot circuit (para 2-23).
37. Dome light inoperative	Loose electrical connections or defective lamp, light, or circuit breaker.	Check electrical connections on dome light and circuit breaker (para 2-23). Replace lamp if defective. If above does not remedy malfunction, troubleshoot circuit (para 2-23).

Table 2-3. Carrier Troubleshooting—Continued

Malfunction	Probable Cause	Corrective Action
HORN AND LIGHTING SYSTEM—Continued		
38. Auxiliary power receptacle inoperative.	Loose electrical connections or defective receptacle.	Check electrical connections on receptacle and in battery compartment (paras 2-23 and 2-27). If above does not remedy malfunction, troubleshoot circuit (paras 2-23 and 2-27).
39. Utility outlet receptacle inoperative.	Loose electrical connections or defective receptacle or circuit breaker.	Check electrical connections on receptacle and circuit breaker (para 2-27). If above does not remedy malfunction, troubleshoot circuit (para 2-27).
40. Trailer electric coupling receptacle inoperative.	Loose electrical connections or defective receptacle.	Check electrical connections on receptacle (para 2-23). If above does not remedy malfunction, troubleshoot circuit (para 2-23).
POWER PLANT ELECTRICAL SYSTEM		
41. Engine oil low pressure warning light fails to go off after engine starts.	Defective warning light or engine oil low pressure switch.	Troubleshoot circuit (para 2-24).
CAUTION Do not operate engine if light stays on.		
42. Engine oil low pressure light fails to come on.	Loose connections or defective warning light or engine oil low pressure switch.	Check connections on warning light, oil pressure switch, and bulkhead connector (para 2-24). If above does not remedy malfunction, troubleshoot circuit (para 2-24).
NOTE With master switch on, engine oil low pressure warning light should be on.		
43. Differential oil high temperature warning light comes on, differential not overheating.	Defective differential oil high temperature transmitter.	Troubleshoot circuit (para 2-24).
CAUTION Do not operate carrier if light stays on.		
44. Transmission oil high temperature warning light comes on, transmission not overheating.	Loose connections or defective transmission oil high temperature transmitter.	Check electrical connections on warning light, transmitter, and bulkhead connector (para 2-24). If above does not remedy malfunction, troubleshoot circuit (para 2-24).
CAUTION Do not operate carrier if light stays on.		
45. Engine coolant temperature indicator fails to register or registers incorrectly.	Loose electrical connections or defective coolant temperature transmitter or coolant temperature indicator.	Check electrical connections on indicator light, transmitter, and bulkhead connector (para 2-24). If above does not remedy malfunction, troubleshoot circuit (para 2-24).
BILGE PUMP ELECTRICAL SYSTEM		
46. Bilge pumps inoperative with switch on.	Loose electrical connections or defective bilge pump switch, circuit breaker, or bilge pump.	Check electrical connections on bilge pump switch, circuit breaker, and bilge pump (para 2-26). If above does not remedy malfunction, troubleshoot circuit (para 2-26).
47. Bilge pump operates but fails to pump water.	a. Bilge pump air vent plugged. b. Defective pump	a. Open vent hole with small wire. b. Replace pump (para 2-139).

Table 2-3. Carrier Troubleshooting—Continued

Malfunction	Probable Cause	Corrective Action
	BILGE PUMP ELECTRICAL SYSTEM—Continued	
48. Bilge pump on indicator light fails to operate with switch on.	Loose electrical connections or defective indicator light.	Check electrical connections on bilge pump indicator light and bilge pump switch (para 2-26). Replace indicator light (para 2-141) if defective. If above does not remedy malfunction, troubleshoot circuit (para 2-26).
	TRANSMISSION AND SHIFTING CONTROLS	
49. Transmission oil high temperature warning light.	a. Defective power plant electrical circuit. b. Restricted transmission oil filter. c. Restricted transmission oil cooler hoses. d. Restricted transmission oil flow e. Internal transmission malfunction	a. Refer to malfunction 44 above. b. Replace transmission oil filter element (para 2-155). c. Check transmission oil cooler hoses. Replace if necessary (para 2-153). d. Replace transmission oil cooler core (para 2-154). e. Notify direct support maintenance personnel.
CAUTION Do not operate carrier if light stays on.		
50. Engine operates properly but carrier fails to move with range selector in any range.	a. Transmission shift linkage out of adjustment. b. Engine disconnect disengaged c. Defective control differential d. Internal transmission malfunction	a. Adjust transmission shift linkage (para 2-213). b. Adjust engine disconnect (para 2-214). c. Notify direct support maintenance personnel. d. Notify direct support maintenance personnel.
51. Engine operates properly but carrier loses power or fails to develop full power in any range.	a. Transmission shift linkage out of adjustment. b. Incorrect adjustment of control differential brakes. c. Malfunction of pivot steering brakes. d. Incorrect adjustment of tracks e. Restricted air cleaner f. Internal transmission malfunction	a. Adjust transmission shift linkage (para 2-213). b. Adjust differential brakes (para 2-162b). c. Refer to malfunction 79 below. d. Adjust track tension (TM 9-1450-585-10). e. Clean air cleaner (para 2-72) or replace air cleaner element (para 2-73) if defective. f. Notify direct support maintenance personnel.
52. Carrier moves forward in neutral.	a. Transmission shift linkage out of adjustment. b. Internal transmission malfunction	a. Adjust transmission shift linkage (para 2-213). b. Notify direct support maintenance personnel.
53. Carrier moves backward in neutral.	a. Transmission shift linkage out of adjustment. b. Internal transmission malfunction	a. Adjust transmission shift linkage (para 2-213). b. Notify direct support maintenance personnel.
54. Engine overspeeds on full throttle.	Internal transmission malfunction	Notify direct support maintenance personnel.
55. Second lockup to third shift point low at full throttle.	a. Transmission throttle linkage out of adjustment. b. Throttle detent stop out of adjustment. c. Internal transmission malfunction	a. Adjust accelerator pedal linkage (para 2-211). b. Adjust throttle detent stop (para 2-211 a (2)). c. Notify direct support maintenance personnel.
56. Second lockup to third converter shift point high at full throttle.	a. Transmission throttle linkage out of adjustment. b. Internal transmission malfunction	a. Adjust accelerator pedal linkage (para 2-211). b. Notify direct support maintenance personnel.

Table 2-9. Carrier Troubleshooting - Continued

Malfunction	Probable Cause	Corrective Action
	TRANSMISSION AND SHIFTING CONTROLS - Continued	
57. Rough shifting	a. Transmission shift linkage out of adjustment. b. Internal transmission malfunction	a. Adjust transmission shift linkage (para 2-213). b. Notify direct support maintenance personnel.
58. 1-2 shift and all lockup shifts occur at engine governor speed or higher.	a. Transmission throttle linkage out of adjustment. b. Internal transmission malfunction	a. Adjust accelerator pedal linkage (para 2-211). b. Notify direct support maintenance personnel.
59. Intermittent buzzing noise	a. Restricted transmission oil filter b. Internal transmission malfunction	a. Replace transmission oil filter element (para 2-155). b. Notify direct support maintenance personnel.
60. Lockup clutch fails to engage in all ranges.	Internal transmission malfunction	Notify direct support maintenance personnel.
61. Slippage in all gears	Internal transmission malfunction	Notify direct support maintenance personnel.
62. Oil leakage at out put shaft	Leaking output shaft seal, bearing retainer, or gasket.	Notify direct support maintenance personnel.
63. No shift to third gear	Internal transmission malfunction	Notify direct support maintenance personnel.
64. Downshift to low, misses second gear.	Internal transmission malfunction	Notify direct support maintenance personnel.
65. Slippage or chatter in all lockup ranges.	Internal transmission malfunction	Notify direct support maintenance personnel.
66. All shift points occur at governor speed except 1-2 at part throttle.	Internal transmission malfunction	Notify direct support maintenance personnel.
67. Deleted		
68. No power transmitted through transfer gearcase although engine is running.	a. Engine disconnect engaged. b. Defective engine disconnect. c. Internal gearcase malfunction.	a. Disengage engine disconnect (engage engine). b. Check for engagement of engine disconnect rod. c. Notify direct support maintenance personnel.
69. Transfer gearcase overheating.	a. Low oil level. b. Deleted. c. Defective bearings. d. Internal gearcase malfunction.	a. Check and add if needed. c. Notify direct support maintenance personnel. d. Notify direct support maintenance personnel.
70. Transfer gearcase excessively noisy.	a. Defective lubrication system. b. Defective bearings. c. Internal gearcase malfunction.	a. Check oil. b. Notify direct support maintenance personnel. c. Notify direct support maintenance personnel.
	DIFFERENTIAL AND FINAL DRIVES	
71. Differential oil high temperature warning light comes on. CAUTION Do not operate carrier if light stays on.	a. Brake bands out of adjustment. b. Disconnect coupling improperly engaged. c. Defective oil high temperature transmitter. d. Restricted oil cooler hoses. e. Defective oil pump relief valve.	a. Adjust differential brakes (para 2-162b). b. Engage coupling (para 2-165.1). c. Troubleshoot electrical circuit (para 2-24). d. Replace oil cooler hoses (para 2-165.1). e. Remove and check oil pump relief valve. Replace if defective (para 2-170).

Table 2-3. Carrier Troubleshooting - Continued

Malfunction	Probable Cause	Corrective Action
	DIFFERENTIAL AND FINAL DRIVES - Continued	
72. Carrier difficult to steer, steers abruptly, one or both brakes grab or brakes do not hold properly.	<i>f.</i> Defective oil pump <i>a.</i> Brakes out of adjustment <i>b.</i> Brake linkage out of adjustment. <i>c.</i> Brake linings worn beyond adjustable limits. <i>d.</i> Internal differential malfunction <i>e.</i> Steering levers out of adjustment.	<i>f.</i> Replace oil pump (para 2-169). <i>a.</i> Adjust differential brakes (para 2-162b). <i>b.</i> Adjust differential brake linkage (para 2-203). <i>c.</i> Notify direct support maintenance personnel. <i>d.</i> Notify direct support maintenance personnel. <i>e.</i> Adjust steering levers (para 2-203).
73. Engine and transmission operate properly but carrier fails to move with range selector in any range.	<i>a.</i> Disconnected or broken propeller shaft or drive plate. <i>b.</i> Internal differential malfunction	<i>a.</i> Check transmission-to-differential propeller shaft (para 2-174). Replace if defective. <i>b.</i> Notify direct support maintenance personnel.
74. Final drive overheated	<i>a.</i> Restricted ventilating system	<i>a.</i> Check final drive ventilating system. Replace if necessary (para 2-178).
75. Oil leaking from final drive.	<i>b.</i> Defective final drive <i>a.</i> Restricted ventilating system <i>b.</i> Loose filler tube elbow. <i>c.</i> Defective input seal <i>d.</i> Leaking output shaft seal <i>e.</i> Leaking from the top of filler tube.	<i>b.</i> Replace final drive (para 2-175). <i>a.</i> Check final drive ventilating system. Replace if necessary (para 2-178). <i>b.</i> Tighten filler tube elbow (9, fig. 2-121). <i>c.</i> Replace input seal (para 2-178). <i>d.</i> Replace final drive (para 2-175). <i>e.</i> Final drive overfilled. Check oil level. Check for correct dipstick (LO 9-1450-585-12).
76. Water in final drive	<i>a.</i> Loose mounting screws. <i>b.</i> Loose filler tube elbow <i>c.</i> Defective input seal <i>d.</i> Leaking output shaft seal	<i>a.</i> Tighten final drive mounting screws (para 2-175). <i>b.</i> Tighten filler tube elbow (9, fig. 2-113). <i>c.</i> Replace input seal (para 2-176). <i>d.</i> Replace final drive (para 2-175).
	PROPELLER SHAFTS, UNIVERSAL JOINTS AND YOKES	
77. Power train noise during operation.	<i>a.</i> Worn universal joints <i>b.</i> Loose universal joint cap screws. <i>c.</i> Worn or defective power plant or differential mounts.	<i>a.</i> Repair universal joints (para 2-172 and 2-173). <i>b.</i> Tighten universal joint cap screws (table 2-22). <i>c.</i> Replace power plant mounts (para 2-30) or differential mounts TM 9-1450-583-34.
	PIVOT STEERING CONTROLS	
78. Pivot steering brakes inoperative when control lever is applied.	<i>a.</i> Pivot steering hydraulic system air locked. <i>b.</i> Leaking hydraulic fluid lines or connections. <i>c.</i> Control linkage out of adjustment. <i>d.</i> Defective hydraulic master cylinder <i>e.</i> Worn pivot steering brake lining.	<i>a.</i> Bleed pivot steering hydraulic system (para 2-204). <i>b.</i> Tighten leaking hydraulic fluid lines or connections. If leaking persists, replace lines or fittings (para 2-206). <i>c.</i> Adjust control linkage (para 2-204). <i>d.</i> Replace hydraulic master cylinder (para 2-205). <i>e.</i> Notify direct support maintenance personnel.
79. Pivot steering brakes do not release.	<i>f.</i> Defective brake assembly <i>a.</i> Restricted hydraulic master cylinder breather. <i>b.</i> Control linkage out of adjustment. <i>c.</i> Warped brake disk	<i>f.</i> Replace brake assembly (para 2-207). <i>a.</i> Check and clean master cylinder breather (para 2-205). <i>b.</i> Adjust control linkage (para 2-204). <i>c.</i> Replace brake disk (para 2-208).

Table 2-3. Carrier Troubleshooting-- Continued

Malfunction	Probable Cause	Corrective Action
PIVOT STEERING CONTROLS —Continued		
79. Continued	d. Defective hydraulic master cylinder e. Defective brake assembly	d. Replace hydraulic master cylinder (para 2-205). e. Replace brake assembly (para. 2-207).
TRACKS AND SUSPENSION		
80. Carrier throws track	a. Defective track adjuster b. Worn drive sprockets c. Bent idler wheel spindle or arm. d. Worn tracks	a. Check track adjuster. If adjuster leaks grease, replace adjuster (para 2-189). b. Check sprockets for wear. If sprockets are excessively worn, reverse or replace (para 2-188). c. Replace idler wheel spindle or arm (paras 2-194 and 2-195). d. Replace worn or defective track shoe or entire track assembly (para 2-182).
81. Carrier sags to one side	a. Broken torsion bar b. Broken torsion bar cap screw.	a. Replace torsion bar (para 2-198). b. Replace torsion bar cap screw (para 2-197).
82. Thumping noise heard during carrier operation.	Worn bushing in one or more track shoes.	Replace defective track blocks (para 2-182).
83. Excessive noise in tracks or suspension during carrier operation.	a. Worn or seized road wheel hub bearings. b. Worn sprocket cushions c. Worn drive sprockets d. Worn track bushings	a. Adjust or replace road wheel hub bearings or idler wheel hub bearings (para 2-193). b. Replace sprocket cushions (para 2-188). c. Check sprockets for wear. If sprockets are excessively worn, reverse or replace (para 2-188). d. Replace worn or defective track blocks (para 2-182).
84. Track does not maintain proper tension.	Defective track adjuster	Replace track adjuster (para 2-189).
85. Leaking road wheel or idler wheel hub.	a. Damaged or defective road wheel hub seal or idler wheel hub seal. b. Leaking road wheel hub sight glass. c. Leaking road wheel hub cover gasket.	a. Replace road wheel hub seal or idler wheel hub seal (para 2-193). b. Replace road wheel hub cover (para 2-193). c. Replace road wheel hub cover gasket (para 2-193).
86. Leaking road wheel support housing.	a. Damaged or defective road wheel arm housing outer seal. b. Defective road wheel arm housing inner seal. c. Loose road wheel arm to housing retainer.	a. Replace outer seal (para 2-193). b. Replace inner seal (para 2-193). c. Tighten road wheel arm retainer to housing cap screws (table 2-23).
87. Rubber on road wheels excessively worn or gouged.	a. Foreign material lodged in track or between sets of road wheels or idler wheels. b. Seized road wheel hub bearings.	a. Remove all foreign material suspension. Replace damaged road wheels (para 2-196). b. Adjust or replace road wheel hub bearings or idler wheel hub bearings (para 2-193).
88. Carrier rides excessively hard.	a. One or more defective shock absorbers. b. One or more road wheel arm bumpers defective.	a. Replace shock absorbers (para 2-185). b. Replace damaged road wheel arm bumpers (para 2-201).
NOTE Shock absorbers should be hot immediately after sustained carrier operation.		
HULL		
89. Hull leaks water during fording operation when hull drain plugs and access plates are secured.	a. Defective tailgate seal b. Cab doors out of adjustment c. Defective cab door seals	a. Replace tailgate seal (para 2-220). b. Adjust cab doors (para 2-234). c. Replace cab door seals (para 2-225).

Table 2-3. Carrier Troubleshooting—Continued

Malfunction	Probable Cause	Corrective Action
HULL—Continued		
89. Continued	d. Loose or broken towing pintle.	d. Tighten or replace towing pintle (para 2-235).
90. Illegible decals, instruction plates, stencil markings, and paint.	Dirty, rusted, corroded, or damaged decals, instruction plates and stencil markings.	Replace decals, instruction plates, and stencil markings that are not legible. Clean and paint bare spots in the painted surface that might permit reflection, rust, or corrosion (para 2-11).
MISCELLANEOUS HULL ACCESSORIES		
91. Speedometer fails to register	a. Defective flexible drive shaft core. b. Defective speedometer adapter c. Defective flexible drive shaft d. Defective speedometer	a. Replace flexible drive shaft core (para 2-258). b. Replace speedometer adapter (para 2-259). c. Replace flexible drive shaft (para 2-256). d. Replace speedometer (para 2-257).
92. Tachometer fails to register	a. Defective flexible drive shaft core. b. Defective flexible drive shaft c. Defective tachometer adapter d. Defective tachometer	a. Replace flexible drive shaft core (para 2-260). b. Replace flexible drive shaft (para 2-262). c. Replace tachometer adapter (para 2-261). d. Replace tachometer (para 2-263).
93. Windshield wiper does not operate.	a. Loose or improper electrical connections. b. Defective windshield wiper switch c. Defective windshield wiper motor	a. Tighten electrical connections or connect properly (para 2-27). b. Replace windshield wiper switch (para 2-254). c. Replace windshield wiper motor (para 2-253).
WINCH		
94. Winch drum does not turn with drum clutch in CLUTCH IN position to reel in cable (drum lock released).	a. Defective or broken spool lock. b. Worn drive clutch c. Broken gears d. Shear pin sheared Worn drive clutch	a. Notify direct support maintenance personnel. b. Notify direct support maintenance personnel. c. Notify direct support maintenance personnel. d. Replace shear pin (para 2-246). Notify direct support maintenance personnel.
95. Winch drum does not turn with drum clutch in CLUTCH OUT position.	Winch brake too tight	Adjust winch brake (para 2-242).
96. Winch case overheats	a. Winch brake out of adjustment. b. Worn winch brake lining	a. Adjust winch brake (para 2-242). b. Notify direct support maintenance personnel.
97. Winch brake does not hold	Worn oil seals in winch, reduction gearbox, or power takeoff.	Notify direct support maintenance personnel.
98. Excessive oil leaks (winch, reduction gearbox, and power takeoff).	a. Worn spiders or yokes b. Loose universal joint cap screws.	a. Replace spiders or yokes (para 2-246). b. Refer to table 2-26.
99. Propeller shaft noisy during operation.	a. Winch control cable out of adjustment or damaged. b. Damaged power takeoff components.	a. Adjust or replace winch control cable (para 2-244). b. Notify direct support maintenance personnel.
100. Power takeoff does not engage when winch control is actuated.	BLAST COVERS Excessive gap between covers	Notify direct support maintenance personnel.
101. Blast covers allow heat or gases into cab.		

Section VI. TROUBLESHOOTING THE ELECTRICAL SYSTEM

2-18. General

a. *Scope.* This section contains detailed troubleshooting information for locating and correcting malfunctions in the electrical system. Each of the functional systems is treated within its own paragraph, which contains:

- (1) An operational and functional description.
- (2) An illustration or illustrations to locate circuits, circuit components, and disconnect points.

Figure 2-4. Electrical circuit diagram.
Located at back of manual.

c. *Carrier Electrical Circuit Numbers.* Refer to table 2-4 for a list of carrier electrical circuit numbers with a brief circuit-tracer of each number. Electrical leads are marked with a circuit numbered metal hand attached to the junction or terminal end of each lead.

2-19. System Circuits

a. *Troubleshooting.* To successfully troubleshoot the electrical system, analyze the entire system as follows:

- (1) Attempt to isolate the functional system which is malfunctioning.
- (2) Isolate the circuit within the system which is malfunctioning.
- (3) Isolate the individual component within the circuit which is causing the malfunction.

(3) Step-by-step tests to diagnose trouble using authorized test equipment.

b. *Carrier Electrical Circuit Diagram.* See figure 2-4 for the carrier electrical circuit diagram. Multiple circuit connector and receptacle plugs are designated C-1, C-2, etc. in figure 2-4 and are referred to in the troubleshooting tables.

b. *Carrier Functional Systems.* The carrier electrical systems are covered in the following paragraphs.

(1) *Battery and generating system.* Refer to paragraph 2-21.

(2) *Starting system.* Refer to paragraph 2-22.

(3) *Horn and lighting system.* Refer to paragraph 2-23.

(4) *Power plant electrical system.* Refer to paragraph 2-24.

(5) *Fuel electrical system.* Refer to paragraph 2-25.

(6) *Bilge pump electrical system.* Refer to paragraph 2-26.

(7) *Carrier hull and miscellaneous electrical system.* Refer to paragraph 2-27.

Table 2-4. Carrier Electrical Circuit Numbers

Number	Description
1	On carriers C-1 through C-143: Generator-regulator pin B to rectifier pin B, and rectifier pin B to generator pin D. On carriers after C-143: Generator-regulator pin B to generator pin D.
1A	Splice from circuit 27 lead to generator field switch.
1B	Generator field switch normally open connection to generator-regulator pin F.
2	On carriers C-1 through C-143: Rectifier pin C to generator-regulator pin C, and generator-regulator pin A to bus bar. On carriers after C-143: Generator pin C to generator-regulator pin C, and generator-regulator pin C, and generator-regulator pin A to bus bar.
3	On carriers C-1 through C-143: Rectifier pin D to generator-regulator pin D, generator-regulator pin C to generator-regulator circuit breaker, and generator-regulator circuit breaker to master switch. On carriers after C-143: Generator pin B to generator-regulator pin D, generator-regulator pin C to generator-regulator circuit breaker, and generator-regulator circuit breaker to master switch.
3A	On carriers C-1 through C-143: Generator pin E to rectifier pin E, and rectifier pin E to generator-regulator pin E. On carriers after C-143: Generator pin E to generator-regulator pin E.
6	Battery positive terminal to starter, and battery positive terminal to bus bar.
7	Battery negative terminal to carrier master switch.
10	Bus bar to instrument panel circuit breaker.
14	Splice with circuit 27 lead to starter switch.
14A	Starter switch to fuel pump switch.
15	Splice from circuit 10 lead to light selector switch pin F.
16	Light selector pin M to beam selecting switch pin G.
17	Beam selecting switch pin F to upper beam of both service headlights.
18	Beam selecting switch pin E to lower beam of both service headlights.

Table 2-4. Carrier Electrical Circuit Numbers—Continued

Number	Description
19	Infrared-blackout selector switch to blackout headlights.
20	Splice from circuit 20-24 lead to front blackout marker lights.
20-24	Light selector switch pin E to splice with circuit 20 and 24 leads.
21	Light selector switch pin H to left stop light-taillight and to trailer electric coupling receptacle pin E.
22	Light selector switch pin C to left stop light-taillight and to trailer electric coupling receptacle pin B.
23	Light selector switch pin N to right stop light-taillight and to trailer electric coupling receptacle pin F.
24	Splice with circuit 20-24 lead to left stop light-taillight, to right stop light-taillight, and to trailer electric coupling receptacle pins A and C.
25	Horn switch to horn.
25A	Splice from circuit 27 lead to horn switch.
27	Instrument panel circuit breaker to circuit 14, 25A, 27A, 27B, 27D leads, and circuit 27G, 27K, 37, 38, 71A, and 400B lead splices.
27A	Splice from circuit 27 lead to fuel quantity indicator.
27B	Splice from circuit 27 lead to coolant temperature indicator.
27D	Splice from circuit 27 lead to master switch on indicator light.
27E	Splice from circuit 10 lead to battery-generator indicator.
27G	Splice from circuit 27 lead to transmission oil high temperature warning light.
27J	Splice from circuit 27 lead to engine oil low pressure warning light.
27K	Splice from circuit 27 lead to differential oil high temperature warning light.
28	Fuel quantity indicator to fuel quantity transmitter.
33	Engine coolant temperature indicator to engine coolant temperature transmitter.
34	Engine oil low pressure switch to engine oil high temperature warning light.
37	Splice from circuit 27 lead to utility outlet receptacle.
38	Splice from circuit 27 lead to dome light and to circuit 41 and 641 lead splices.
40	Light selector switch pin B through harness connector to instrument panel lights.
48	On carriers C-1 through C-143: Bus bar to splice with bypass capacitor, communications receptacle, and circuit 400 and 400A leads.
49	Bus bar to auxiliary power receptacle.
50	Auxiliary power receptacle to ground.
71	Windshield wiper switch to windshield wiper.
71A	Windshield wiper switch to splice with circuit 27 lead.
74	Fuel pump switch to neutral start switch.
74A	Neutral start switch through connector to starter relay pin D.
74B	Starter relay pin B to starter ground strap.
74C	Starter relay pin C to starter.
74D	Starter relay pin D to starter solenoid.
75	Stop light switch through harness connector to light selector switch pin K.
75A	Light selector switch pin A through harness connector to stop light switch.
76	Bus bar to fuel pump switch.
77	Engine fuel pump circuit breaker to splice with circuit 77-78 lead.
77A	Engine fuel pump circuit breaker to engine fuel pump.
77-78	Fuel pump switch to splice with circuit 77 and 78 leads.
78	Engine fuel pump circuit breaker to splice with circuit 77-78 lead.
78A	Engine fuel pump circuit breaker to engine fuel pump.
90	Trailer electric coupling receptacle pins D and L to ground.
327	Transmission oil high temperature switch through receptacle pin G to transmission oil high temperature warning light.
328	Differential oil high temperature switch through receptacle pin A to differential oil high temperature warning light.
400	On carriers C-1 through C-143: Splice from circuit 48 lead for personnel heater kit control box.
400A	On carriers after C-143: From bus bar for personnel heater kit control box. On carriers C-1 through C-143: Splice from circuit 48 lead for coolant heater kit control box.
400B	On carriers after C-143: Splice from circuit 400 lead for coolant heater kit control box.
406	Air box heater switch to splice with circuit 27 lead.
450	Air box heater switch through receptacle pin C to coil receptacle pins A and B.
450A	Rear bilge pump circuit breaker to bilge pump switch.
450B	Bus bar to rear bilge pump circuit breaker.
450C	Front bilge pump circuit breaker to bilge pump switch. Bus bar to front bilge pump circuit breaker.

Table 2-4. Carrier Electrical Circuit Numbers—Continued

Number	Description
451	Rear bilge pump to bilge pump switch and indicator light.
452	Front bilge pump to bilge pump switch and indicator light.
500	On carriers C-1 through C-143 only: Generator pin A to rectifier pin A.
501	On carriers C-1 through C-143 only: Generator pin B to rectifier pin B.
502	On carriers C-1 through C-143 only: generator pin C to rectifier pin C.
514	Beam selecting switch pin B to infrared headlight upper beam.
515	Beam selecting switch pin A to infrared headlight lower beam.
514-515	Beam selecting switch pin C to infrared-blackout selector switch.
519	High beam indicator light to beam selecting switch pin D.
519A	High beam indicator light to beam selecting switch pin H.
520	Light selector switch pin D to infrared-blackout selector switch.

2-20. Electrical Test Equipment

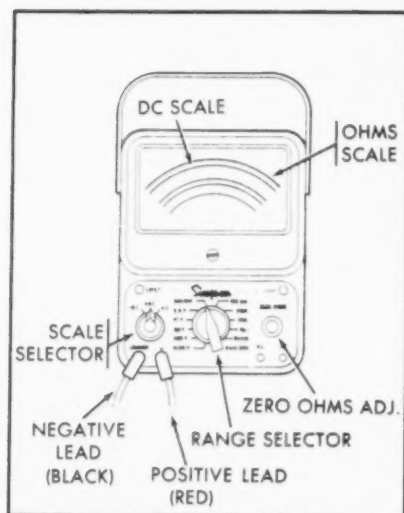
See figure 2-5 for electrical test equipment and method of performing electrical test specified in electrical troubleshooting tables.

CAUTION

The organizational mechanic should insure a proper ground exists between item to be checked and the carrier.

MULTIMETER

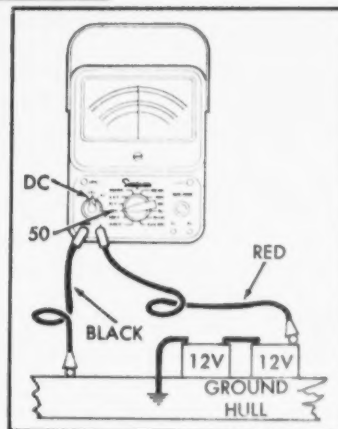
TEST EQUIPMENT: The authorized test equipment is Multimeter-6625-543-1438. It is a component of Tool Kits, Automotive Maintenance, Organizational Set No. 1, Supplemental (SM9-4-4910-A87), and Set No. 2, Supplemental (SC4940-95-CL-A08).



USE OF MULTIMETER

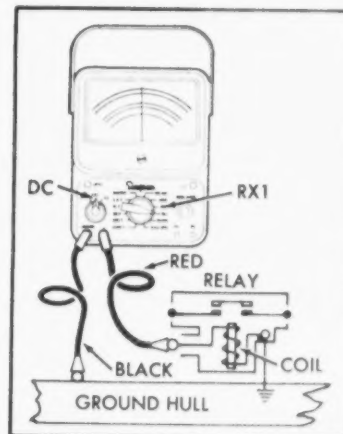
1. DC VOLTAGE TEST

1. Make certain what test you are making.
2. Select voltage range higher than expected reading.
3. Select DC scale on meter.
4. Connect negative (marked - or colored black) lead first.
5. Touch positive (marked + or colored red) lead and observe needle for correct movement prior to clipping.
6. DC voltage test is made to measure battery, generator or signal voltages.



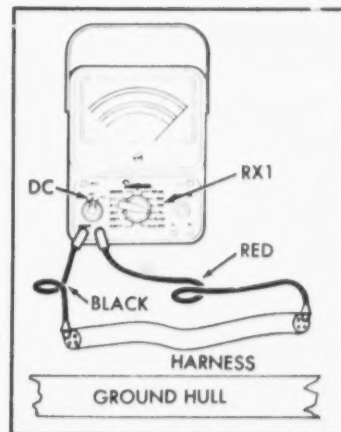
2. RESISTANCE TEST

1. Make certain what test you are making.
2. Turn vehicle master switch "OFF."
3. Select DC Scale on meter.
4. Select desired resistance range.
5. Touch leads together and adjust to "0" needle position.
6. Resistance test is made to measure resistance or ohmic values of coils and resistors as given in test procedures.



3. CONTINUITY TEST

1. Make certain what test you are making.
2. Turn vehicle master switch "OFF."
3. Select DC scale on meter.
4. Select RX1 scale.
5. Continuity test is used to check if wire or connector is in good condition. "0" reading indicates good cable, such as shown. High resistance reading or no needle movement may indicate an open circuit, damaged cable, or poor solder joint.



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Figure 2-5. Electrical test equipment.

2-21. Battery and Generating System

(fig. 2-6, early models; fig. 2-6.1, late models).

NOTE

On carriers after C-143, the separate rectifier has been removed and is incorporated as an integral part of the new generator.

a. Operational Description. The 24-volt battery and generating system consists of two 12-volt batteries connected in series, a master switch, instrument panel circuit breaker, master switch indicator light; generator, rectifier, generator-regulator circuit breaker, generator field switch, and connecting leads and cables. On early models (fig. 2-6) the rectifier is a separate unit. On later models (fig. 2-6.1) the rectifier is built into the generator. The alternating current of the generator, converted to direct current by the rectifier and controlled by the generator-regulator, is used to keep the batteries fully charged and supply the carrier electrical systems. The batteries are negative grounded to the carrier hull through the master switch. The generator field switch, actuated by fuel pressure, energizes the generator field. The generator-regulator circuit breaker protects the generating system from overload and reverse polarity.

b. Functional Description

(1) With the master switch ON, the condition of the battery-generating system is as follows:

- (a) Batteries are charged.
- (b) Master switch is closed.

(c) Master switch on indicator light is on.
(d) Instrument panel circuit breaker is energized and closed.

(e) Generator field switch is open and voltage is applied.

(f) Rectifier is de-energized.

(g) Regulator is de-energized.

(h) Generator-regulator circuit breaker is energized and closed.

(i) Battery-generator indicator is energized and indicating battery condition.

(2) With engine running and the master switch ON, the condition of the battery-generating system is as follows:

(a) Batteries are charged.

(b) Master switch is closed.

(c) Master switch on indicator light is on.

(d) Instrument panel circuit breaker is closed.

(e) Generator field switch is energized and closed.

(f) Rectifier is energized.

(g) Generator-regulator is energized.

(h) Generator-regulator circuit breaker is closed.

(i) Battery-generator indicator is energized and indicating generator-regulator output.

c. Troubleshooting. Refer to table 2-5 and see figure 2-6 for troubleshooting the battery and generating system. Tests are given in order of probable component or circuit malfunction and should be checked in that order during troubleshooting.

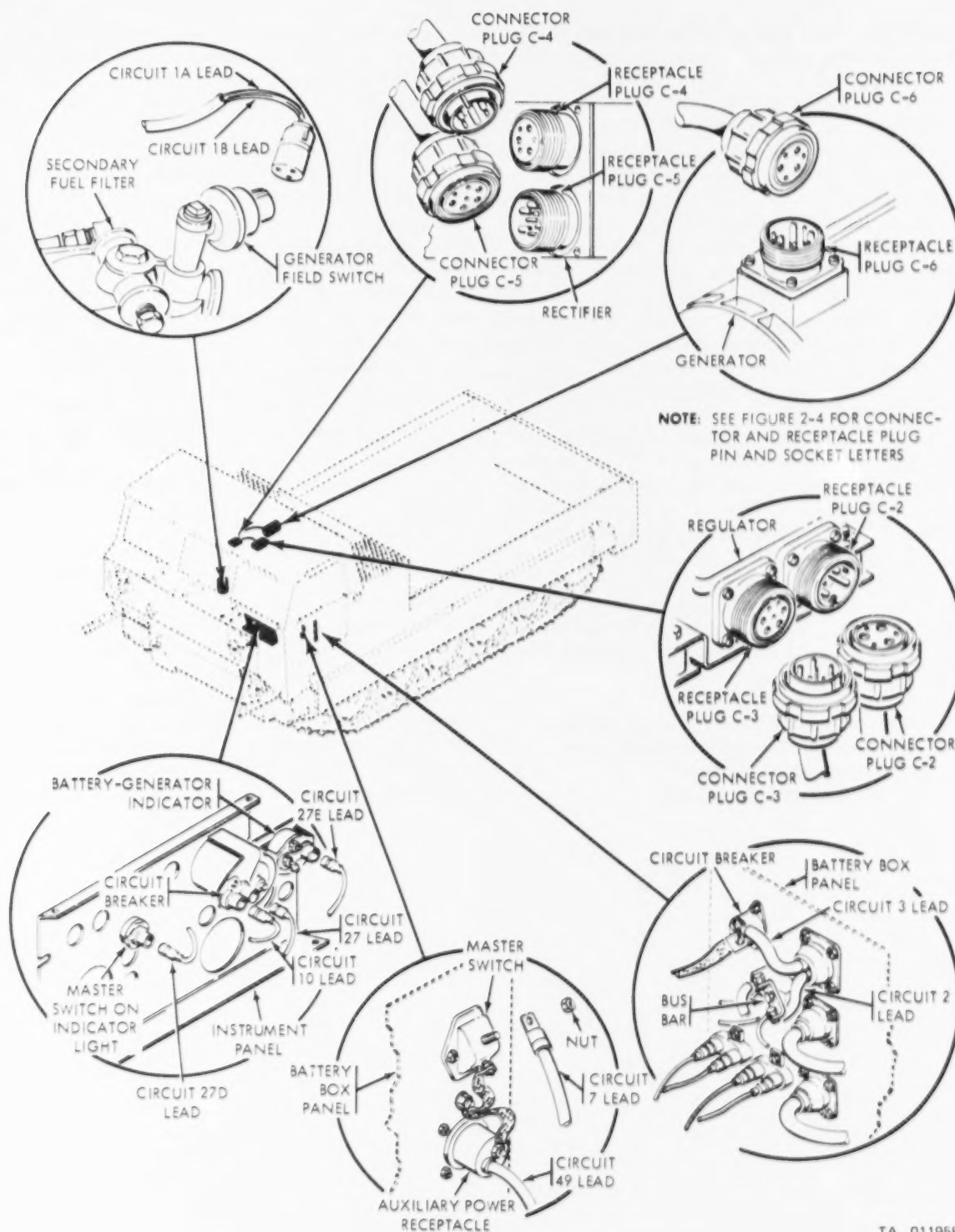


Figure 2-6. Battery and generating system (early models).

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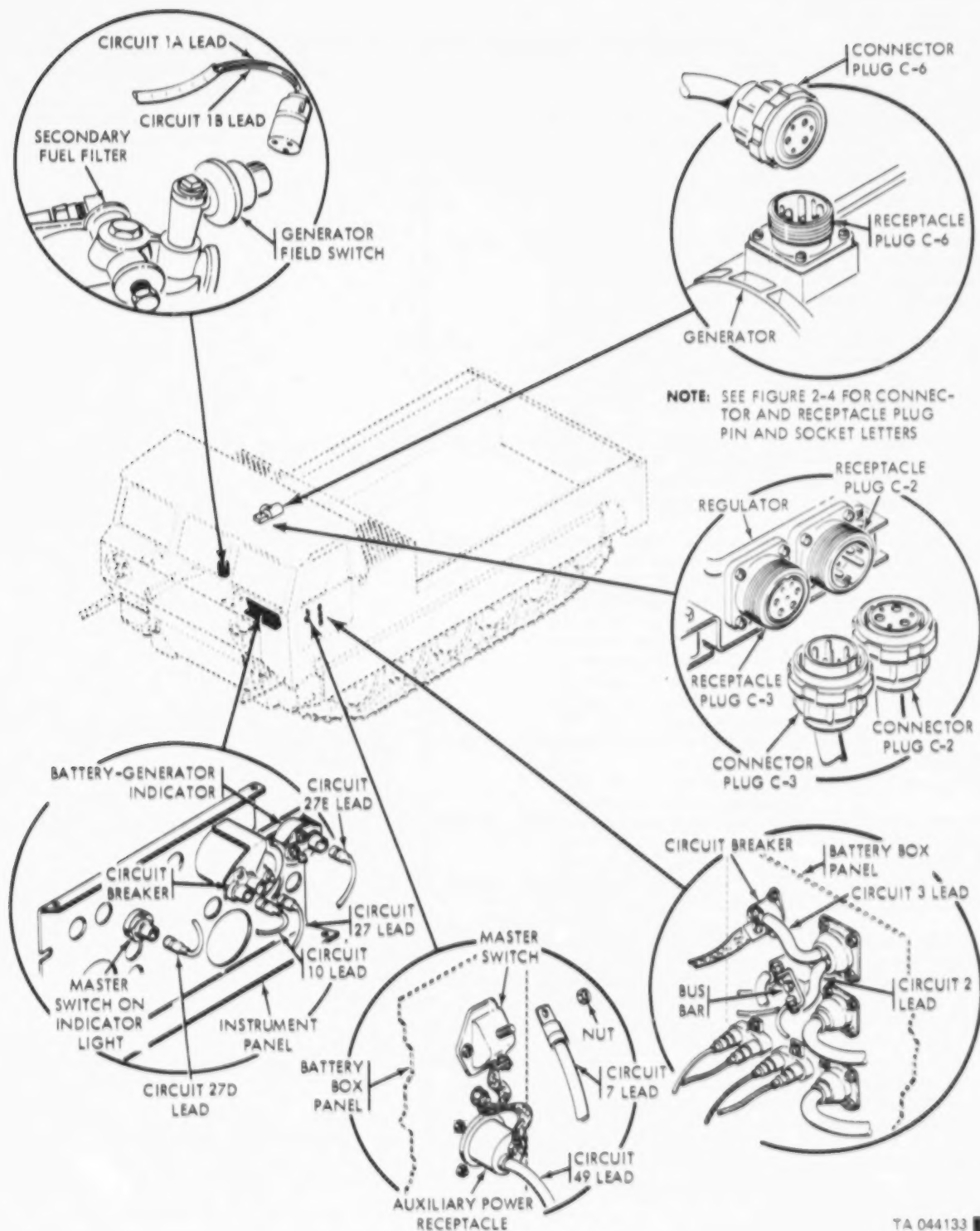


Figure 2-6.1. Battery and generating system (late models).

Table 2-5. Battery and Generating System Electrical Troubleshooting

Battery and generating system malfunction	Tests
1. Master switch on indicator light fails to come on when master switch is turned ON.	Test 1. Operate starter; if starter and indicator light both are malfunctioning, test batteries (para 2-98).
	Test 2. Operate starter; if starter operates, test lamp by checking resistance from center contact through filament to metal body on side of lamp. If resistance is infinity or 0 ohms, replace defective lamp (para 2-93).
	Test 3. If lamp is good in test 2 above, with lamp removed, disconnect circuit lead and check resistance from disassembled connector on light through light ground. Reading should be infinity. If any other reading is obtained, replace defective light (para 2-93).
	Test 4. Disconnect circuit 7 lead from master switch. Turn master switch ON. Check resistance from disconnected terminal on switch, through switch, to carrier ground. If there is any measurable resistance, replace defective switch (para 2-102).
	Test 5. Disconnect circuit 27 and 10 leads from instrument panel circuit breaker. Put probes on pins to read through circuit breaker. If reading is 0 ohms, circuit breaker is good. If reading is infinity, replace defective circuit breaker (para 2-95).
	Test 6. Disconnect circuit 10 lead from instrument panel circuit breaker and bus bar on distribution panel. Put probe on each end and check continuity. If reading is 0 ohms, lead is good. If reading is infinity, notify direct support maintenance personnel.
	Test 7. Disconnect circuit 27 lead at instrument panel circuit breaker and circuit 27D lead at master switch on indicator light at instrument panel. Put probe on each end of circuit lead. If reading is 0 ohms, circuit is good. If reading is infinity, notify direct support maintenance personnel.
	Test 8. Disconnect circuit 7 lead from master switch and batteries. Put probe on each end and measure resistance. If reading is 0 ohms, circuit is good. If reading is infinity, notify direct support maintenance personnel.
	Test 9. Disconnect circuit 6 lead from battery and starter. Put probe on each end. If reading is 0 ohms, circuit is good. If reading is infinity, notify direct support maintenance personnel.
2. Battery-generator indicator fails to operate with master switch in ON position (no pointer movement).	Test 1. Place master switch in ON position. If electrical equipment is inoperative, test batteries, master switch, and leads. Refer to tests 3, 4, 7, 8, and 9, malfunction 1. above.
	Test 2. Place master switch in ON position. If electrical equipment is operating normally, place master switch in OFF position. Disconnect circuit 27E lead at indicator and circuit 10 lead at bus bar. Check resistance of circuit 27E and 10 leads. If reading is 0 ohms, replace defective battery-generator indicator (para 2-111). Check belts and tighten if loose.
3. No generator output indicated by battery-generator indicator.	Test 1. Test batteries (para 2-98), and replace if necessary.
	Test 2. With engine running, disconnect circuit 1A and 1B leads from generator field switch. Read resistance through switch. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-137).
	Test 3. Check generator-regulator adjustment (para 2-108). If generator-regulator cannot be adjusted, proceed to test 4 or 9.

NOTE

Perform tests 4 through 8 on carriers C-1 through C-143 with separate rectifier, and test 9 on carriers after C-143 with integral rectifier.

Table 2-5. Battery and Generating System Electrical Troubleshooting

Battery and generating system malfunction	Tests
3. Continued	Test 4. Remove lug C-6 from generator to perform tests 5 through 8. Check pins A through E to ground. Reading should be infinity. If reading is less than infinity, replace defective generator (para 2-103). Test 5. Check pin A through generator to pin B. Reading should be 0 ohms or indicate low resistance (0.045 to 0.055 ohm). If reading is infinity, replace defective generator (para 2-103). Test 6. Check pin A through generator to pin C. Reading should be 0 ohms or indicate low resistance (0.045 to 0.055 ohm). If reading is infinity, replace defective generator (para 2-103). Test 7. Check pin B through generator to pin C. Reading should be 0 ohms or indicate low resistance (0.045 to 0.055 ohm). If reading is infinity, replace defective generator (para 2-103). Test 8. Check pin D through generator to pin E. Reading should be 0 ohms or indicate low resistance (1.675 to 1.92 ohm). If reading is infinity, replace defective generator (para 2-103). Test 9. Remove plug C-6 from generator. Check resistance between each pin and the generator housing. If any of the readings are 0 ohms or less than infinity, the generator is grounded. Replace the generator. Check resistance between pins E and D. If resistance is infinite (no needle movement) replace the generator. Check resistance between pins E and C, then reverse the meter probes and again check resistance between pins B and C. You should get needle movement in only one of the two probe locations. If not, replace the generator (para 2-103). NOTE Perform step 9.1 through 9.4 on DC generators with built-in rectifiers only. Remove plug C6 from generator to perform test 9.1 through 9.4 Test 9.1. Check from pins B, C, D, and E to ground. Reading should be infinity. If reading is less than infinity, replace defective generator (para 2-103). Test 9.2. Check between pins D and E. Reading should be approximately 2 ohms. If reading is not between 1.3 and 2.8 ohms, replace defective generator (para 2-103). Test 9.3. Check between pins D and B and D and C. Reading should be infinity. If either reading is less than infinity, replace defective generator (para 2-103). Test 9.4. Check between pins B and C using RX1 scale. With the probes polarized one direction on generator pins, the reading should be between 20 and 35 ohms. With test probes connected in opposite polarity, reading should be infinity. If readings are not as indicated, replace defective generator (para 2-103). Test 10. Test generator-regulator circuit breaker. Put probes on terminals to read through circuit breaker. Reading should be 0 ohms. If reading is infinity, replace defective circuit breaker (para 2-110). NOTE Perform test 11 through 15 on carriers C-1 through C-143 with separate rectifier and test 16 on carriers after C-143 with integral rectifier. Test 11. Remove plugs C-5 and C-4 from rectifier to perform tests 11 through 15. Check pin D in C-4 through rectifier to sockets A, B, and C in C-5. Reading should be 1 to 10 ohms. Reverse leads on ohmmeter. Reading should be 100 to 1,000 ohms.

Table 2-5. Battery and Generating System Electrical Troubleshooting

Battery and generating system malfunction	Tests
3. Continued	Test 12. Check pin C in C-4 through rectifier to sockets A, B, and C in C-5. Reading should be 1 to 100 ohms. Reverse leads on ohmmeter. Reading should be 100 to 1,000 ohms. Test 13. Check pin B in C-4 through rectifier to pin D in C-5. Reading should be 0 ohms. If reading is not as indicated in tests 11 and 12, replace defective rectifier (para 2-107). Test 14. Check cable between generator and rectifier by removing plugs C-6 and C-5. Read from socket A in plug C-6 to pin A in C-5, socket B to pin B, socket C to pin C, socket D to pin D, and socket E to pin E. Reading should be 0 ohms. If reading is infinity, repair harness (para 2-996). Test 15. Check cable between rectifier and regulator by removing plugs C-3 and C-4. Read from pin B in plug C-3 to socket B in C-4, pin C to socket C, pin D to socket D, and pin E to socket E. Reading should be 0 ohms. If reading is infinity, repair harness (para 2-96).

Battery and generating system malfunction	Tests
3. Continued	Test 16. Check cable between generator and generator-regulator by removing plugs C-3 and C-6. Read from pin B in plug C-3 to socket D in plug C-6, pin C to socket C, pin D to socket B, and pin E to socket E. All readings should be 0 ohms. If any reading is infinity, repair harness (para 2-96). Test 17. Remove plug C-2. Put probes on pin A and at end of circuit 2 lead at bus bar. Reading should be 0 ohms. If reading is infinity, repair harness (para 2-96). Test 18. Disconnect circuit 1 B lead at regulator and at generator field switch. Touch probes to each end. Reading should be 0 ohms. If reading is infinity, separate circuit at connector (near fuel filter), and check resistance from connector to generator field switch and from connector to regulator. Reading should be 0 ohms. If reading is infinity, repair harness (para 2-96). Test 19. Disconnect circuit 1 A lead at generator field switch and circuit 27 lead at instrument panel circuit breaker. Put probe on each end. Reading should be 0 ohms. If reading is infinity, repair harness (para 2-96). Test 20. Check and adjust generator-regulator (para 2-108). If generator-regulator cannot be adjusted, replace defective generator-regulator (para 2-108). Test. Perform tests 1 through 20, malfunction 3 above. Test. Perform tests 1 through 20, malfunction 3 above.
4. Continuous high or low battery charging rate as indicated by battery-generator indicator.	
5. Batteries overheating	

2-22. Starting System

a. Operational Description. The starting system consists of the instrument panel circuit breaker, starter switch, fuel pump switch, neutral start switch, starter relay, starter solenoid, starter assembly, and connecting leads and cables. The carrier batteries supply current for starting the engine. The fuel pump switch turns on the fuel pumps to assure that fuel is in the air separator tank. The neutral start switch prevents starting the engine with the transmission in gear. The starter relay and starter are energized by depressing the starter switch.

b. Functional Description.

(1) With the master switch OFF and starter switch released, the condition of the starting system is as follows:

- (a) Batteries are charged.
- (b) Master switch is open.
- (c) Fuel pump switch is open or closed and no voltage is applied.
- (d) Instrument panel circuit breaker is closed and de-energized.
- (e) Starter switch has no voltage applied.
- (f) Neutral start switch has no voltage applied.
- (g) Starter relay is de-energized and points

are open.

(h) Solenoid starter is de-energized, and points are open with voltage applied.

(i) Starter is de-energized.

(2) With the master switch ON, range selector in neutral position, and the starter switch depressed, the condition of the starting system is as follows.

- (a) Batteries are charged.
- (b) Master switch is closed.
- (c) Fuel pump switch is open and voltage is applied (after engine start switch is energized and closed).
- (d) Instrument panel circuit breaker is closed.
- (e) Starter switch is energized and closed.
- (f) Neutral start switch is energized and closed.
- (g) Starter relay coil is energized and points are closed.
- (h) Solenoid-actuated switch on starter coil is energized and points are closed.
- (i) Starter is energized and operating.

c. Troubleshooting. Refer to table 2-6 and see figure 2-7 for troubleshooting the starting system. Tests are given in order of probable component or circuit malfunction and should be checked in that order during troubleshooting.

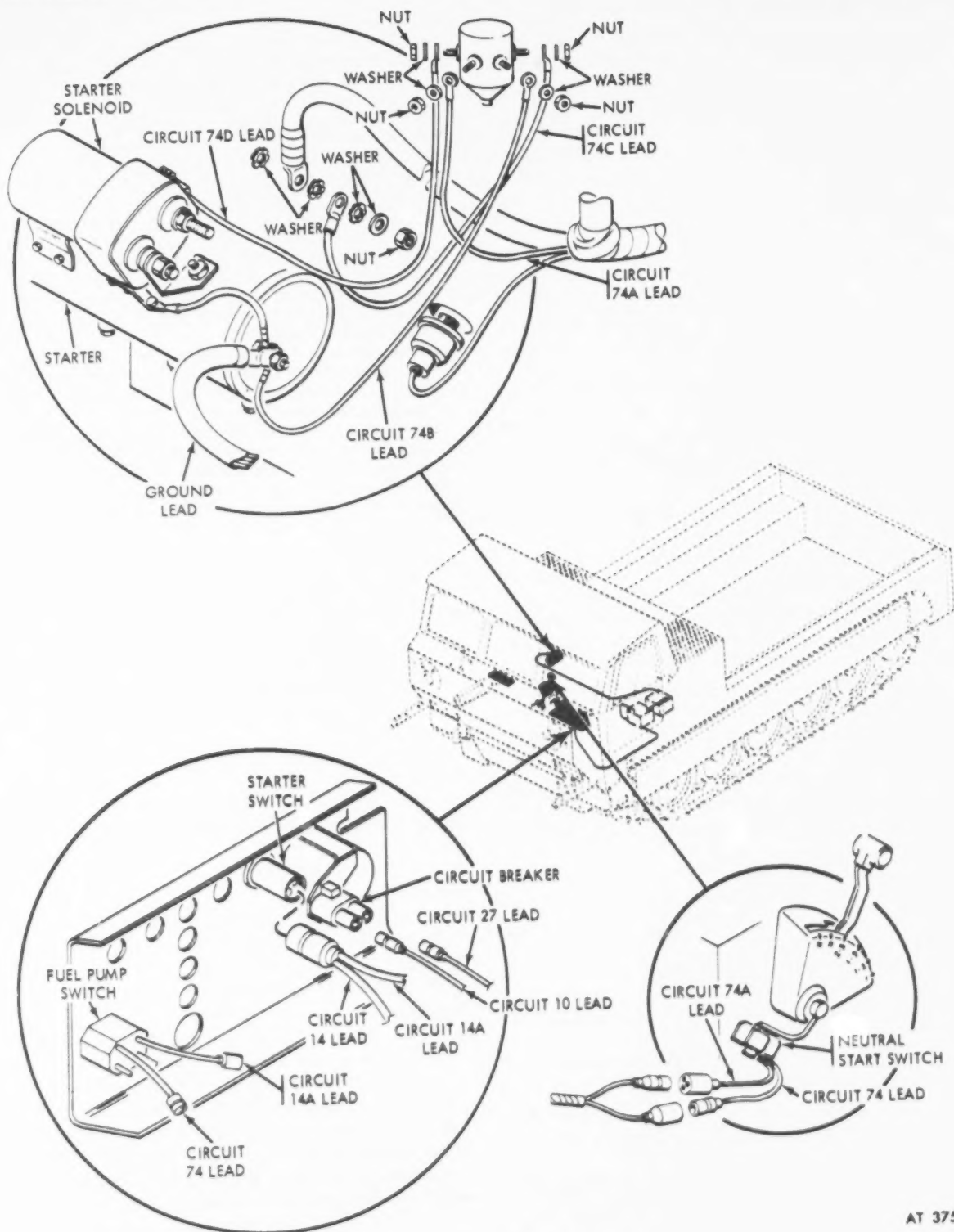


Figure 2-7. Starting system.

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2-23. Horn and Lighting System

a. *Operational Description.* The horn and lighting system consists of the instrument panel circuit breaker, horn switch, light selector switch, infrared-blackout selector switch, beam selecting switch, stop light switch, horn, instrument panel lights, service headlights, infrared headlights, blackout marker lights, blackout headlight, stop light-taillights, trailer electric coupling receptacle, dome light, and connecting leads. The horn switch controls the horn, and the dome light switch

controls the two lamps in the dome light. The light selector switch, stop light switch, and infrared-blackout selector switch control the instrument panel light, exterior lights, and the trailer electric coupling receptacle.

b. *Functional Description.*

(1) With the master switch OFF, the condition of the horn and lighting system is as follows:

- (a) Batteries are charged.
- (b) Master switch is open.

Table 2-6. Starting System Electrical Troubleshooting

Starting system malfunction	Tests
Engine does not crank when starter switch is depressed.	Test 1. Check batteries (para 2-98). Test 2. Disconnect circuit 6 lead from starter. Check resistance from circuit 6 lead connector on starter to carrier ground. Reading should be infinity. If any other reading is obtained, replace defective starter (para 2-113). Test 3. Measure resistance from connecting strap between solenoid and starter, through starter, to ground. Reading should be 0 ohms. If any other reading is obtained, solenoid is defective; replace starter (para 2-113). Test 4. Measure resistance from circuit 74D lead on solenoid through solenoid to ground. Reading should be 1 ohm. If higher or lower reading is obtained, solenoid is defective; replace starter (para 2-113). Test 5. Disconnect circuit 74D lead from starter solenoid and starter relay. Put probe on each end. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 6. Disconnect circuit 74C and 74D starter leads from starter relay. Put probe on relay terminals. Reading should be infinity. If any other reading is obtained, notify direct support maintenance personnel. Test 7. Disconnect circuit 74A lead from starter relay, and measure resistance from relay terminal through relay coil to ground. Reading should be 28 ohms. If any other reading is obtained, replace defective relay (para 2-114). Test 8. Remove circuit 74A lead from neutral start switch and from starter relay. Put probe on each end. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 9. Disconnect circuit 74 and 74A leads from neutral start switch. With range selector shift lever in neutral, measure resistance through switch. Reading should be 0 ohms. If any other reading is obtained, replace defective switch (para 2-115). Test 10. Disconnect circuit 74 lead from neutral start switch and fuel pump switch. Put probe on each end. Reading should be 0 ohms. If any other reading is obtained, notify direct support maintenance personnel. Test 11. Disconnect circuit 14A and 74 leads from fuel pump switch. Place fuel pump switch in ON position. Check resistance through switch. Reading should be 0 ohms. If any other reading is obtained, replace defective switch (para 2-50). Test 12. Disconnect circuit 14A lead at starter switch and fuel pump switch. Place probe on ends of circuit lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 13. Disconnect circuit 14 and 14A leads from starter switch. With switch on, measure resistance through switch. Reading

Table 2-6. Starting System Electrical Troubleshooting—Continued

Starting system malfunction	Tests
	should be 0 ohms. If any other reading is obtained, replace defective switch (para 2-116).
Test 14.	Disconnect circuit 14 lead from starter switch and circuit 27 lead from instrument panel circuit breaker. Put probe on each end. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel.
Test 15.	Perform test 5, malfunction 1, table 2-5.
Test 16.	Perform test 6, malfunction 1, table 2-5.
Test 17.	Perform test 4, malfunction 1, table 2-5.

(c) Instrument panel circuit breaker is de-energized and closed.

(d) Infrared-blackout selector switch has no voltage applied.

(e) Dome light is off.

(f) Horn switch has no voltage applied.

(g) Horn is de-energized.

(h) Light selector switch has no voltage applied.

(i) Stop light switch has no voltage applied.

(j) Trailer electric coupling receptacle has no voltage applied.

(k) All lights are off.

(2) With the master switch ON, the condition of the horn and lighting system is as follows:

(a) Batteries are charged.

(b) Master switch is closed.

(c) Instrument panel circuit breaker is energized and closed.

(d) Infrared-blackout selector switch has voltage applied.

(e) Dome light is on when dome light switch is in ON position.

(f) Horn switch has voltage applied.

(g) Horn is energized when horn switch is depressed.

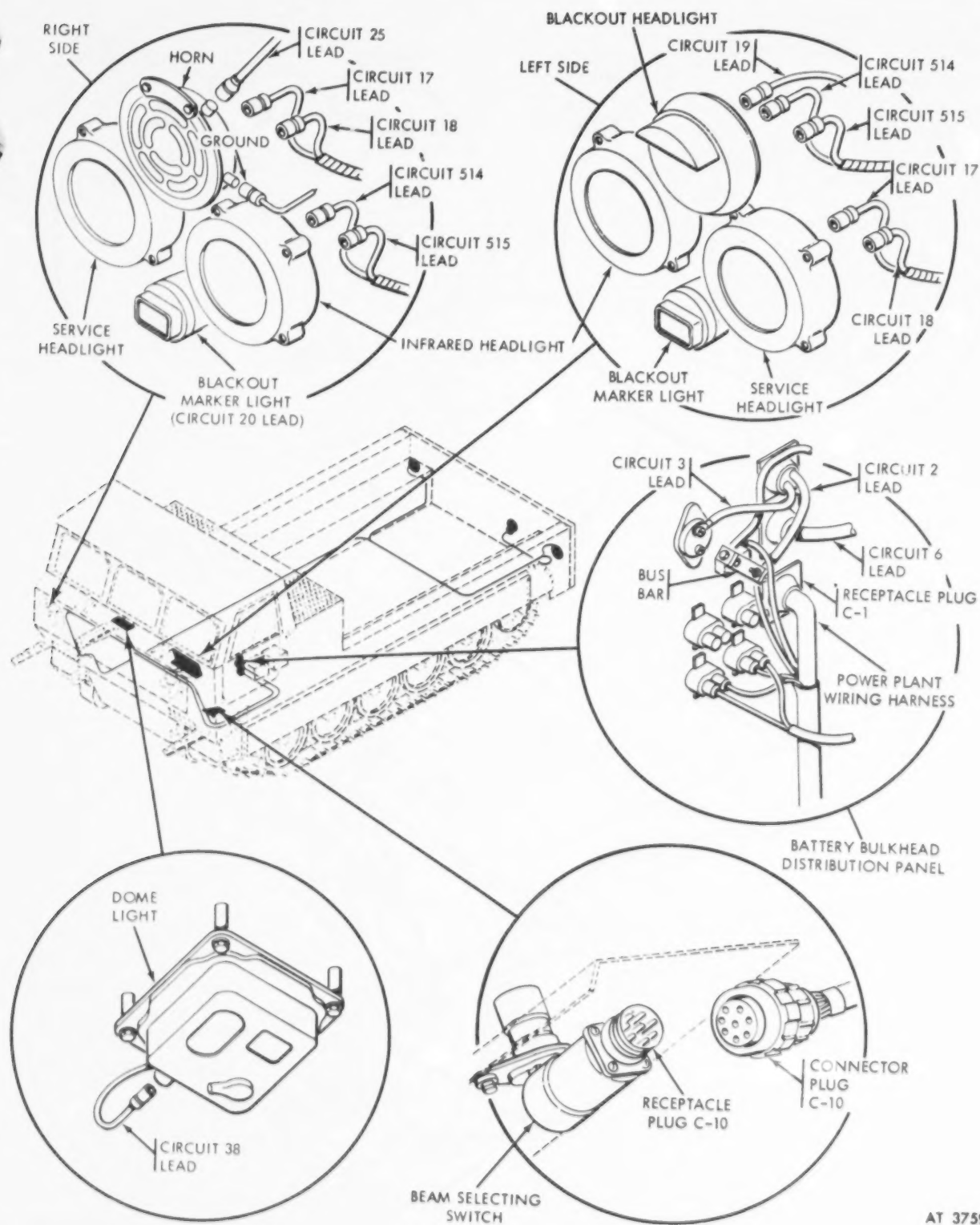
(h) Light selector switch has voltage applied to connection F.

(i) Stop light switch has voltage applied when lever of light selector switch is in STOP LIGHT or SER DRIVE positions.

(j) Trailer electric coupling receptacle is de-energized or energized, depending on the position of the light selector switch, stop light switch, and infrared-blackout selector switch.

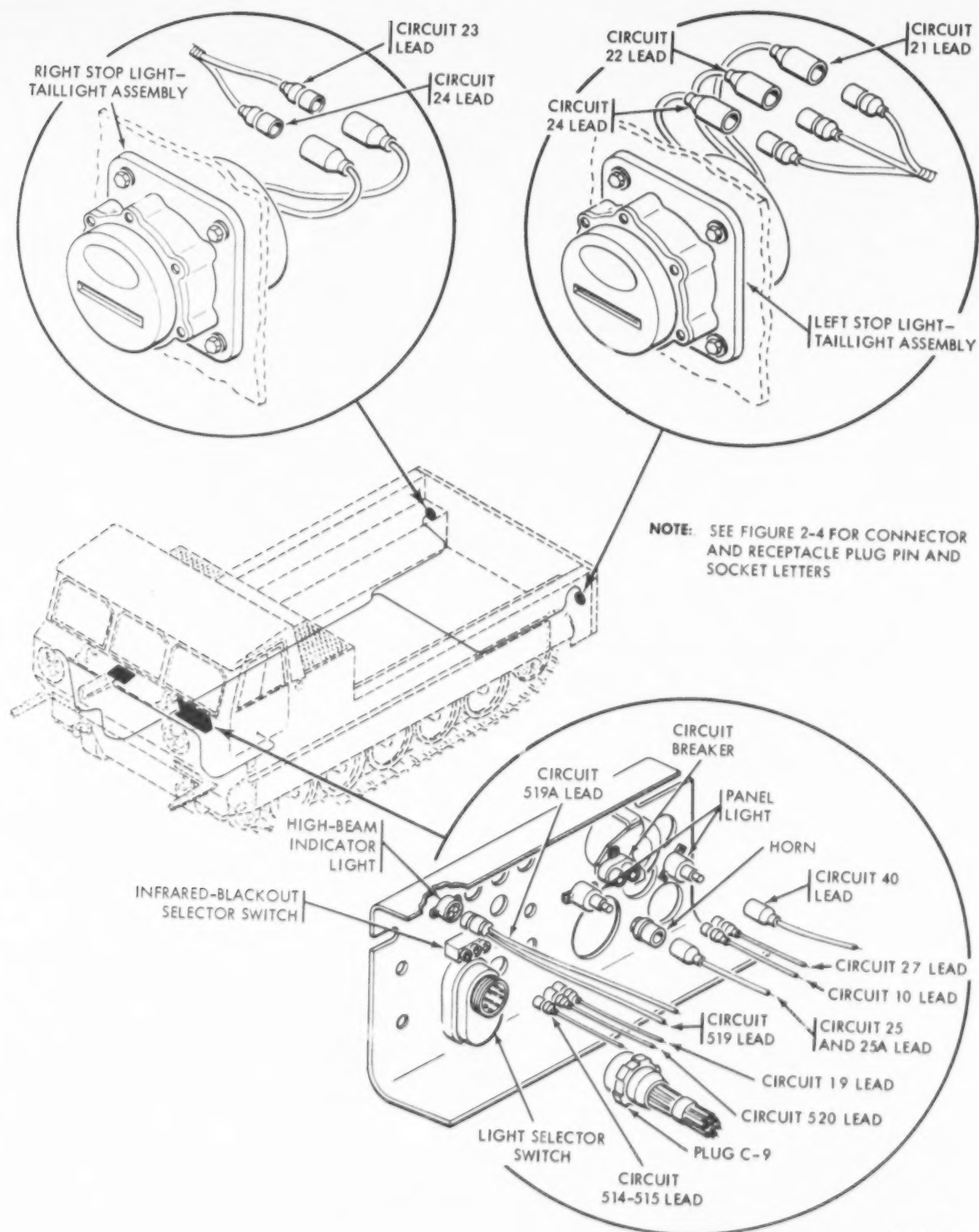
(k) Lights are off or on, depending on the position of the light selector switch, stop light switch, and infrared-blackout selector switch.

c. *Troubleshooting.* Refer to table 2-7 and see figure 2-8 for troubleshooting the horn and lighting system. Tests are given in order of probable component or circuit malfunction and should be checked in that order during troubleshooting.



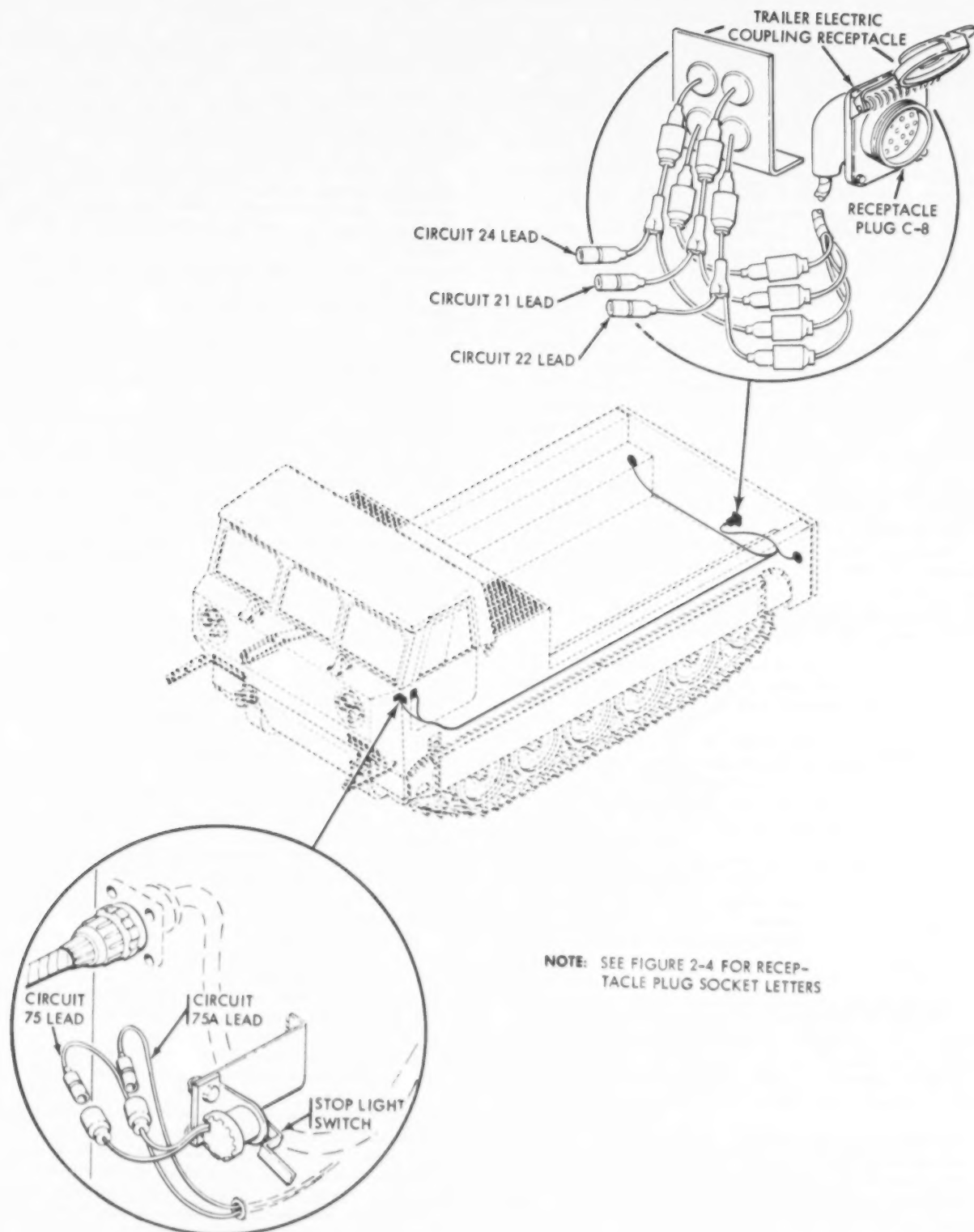
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Figure 2-8. Horn and lighting system (sheet 1 of 3).



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Figure 2-8. Horn and lighting system (sheet 2 of 3).



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Figure 2-8. Horn and lighting system (sheet 3 of 3).

Table 2-7. Horn and Lighting System Electrical Troubleshooting.

Horn and lighting system malfunction	Tests
1. Horn fails to sound	Test 1. Check batteries (para 2-98). Test 2. Disconnect circuit 25 lead from horn. Check resistance from horn connector through horn to carrier ground. Reading should be less than 10 ohms. If higher reading is obtained, replace defective horn (para 2-118). Test 3. Disconnect circuit 25 and 25A leads from horn switch, and test resistance through switch. Reading should be infinity with switch in open position and 0 ohms with switch in closed position. If any other reading is obtained, replace defective switch (para 2-119). Test 4. Disconnect circuit 25 lead from horn and from horn switch. Put probe on each end. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 5. Disconnect circuit 25A lead at horn switch and circuit 27 lead from circuit breaker at instrument panel. Put probe on each end. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 6. Disconnect circuit 27 and 10 leads from instrument panel circuit breaker. Check resistance through circuit breaker. Reading should be 0 ohms. If reading is infinity, replace defective circuit breaker (para 2-95). Test 7. Disconnect circuit 10 lead at instrument panel circuit breaker and at bus bar. Check resistance of disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
2. Panel light inoperative in any one or any combination of switch positions.	Test 1. Test lamp. Place probes on bulb terminal and metal base, and check resistance. Reading should indicate some resistance. If reading is 0 ohms or infinity, replace defective lamp (para 2-94). Test 2. Disconnect circuit 40 lead at panel light. Check resistance from center connector to ground. Reading should indicate some resistance. If reading is infinity or 0 ohms, replace defective light assembly (para 2-93). Test 3. Disconnect plug C-9 at light selector switch and circuit 40 lead at panel light. Check resistance from socket B in plug C-9 to ends of lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 4. Disconnect circuit 10 lead at bus bar and plug C-9 at light selector switch. Check resistance from socket F to end of circuit 10 lead. Reading should be 0 ohms. If reading is infinity, wiring harnesses are defective; notify direct support maintenance personnel. Test 5. If tests 1 through 4 are satisfactory, replace defective light selector switch assembly (para 2-128).
3. High beam indicator light inoperative.	Test 1. Test lamp. Check resistance from center contact to metal base of bulb. If reading is infinity, replace defective lamp (para 2-94). Test 2. Install lamp. Insert probe on lead to light, and ground other lead. Reading should indicate some resistance. If reading is 0 ohms or infinity, replace defective light (para 2-93). Test 3. Disconnect plug C-10 from beam selecting switch. Place switch in low beam position. Check resistance from pin D to pin B, and from pin H to pin F. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-126). Test 4. Disconnect circuit 519 and 519A leads from high beam indicator light, and disconnect plug C-10 from beam selecting switch. Check resistance from socket H in plug C-10 to end of circuit 519A lead; check resistance from socket D in plug C-10 to end of circuit 519 lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.

Table 2-7. Horn and Lighting System Electrical Troubleshooting—Continued

Horn and lighting system malfunction	Tests
4. Service headlight or headlights inoperative on one or both beams.	Test 1. If one headlight is inoperative on one beam, disconnect lead for that beam at headlight (circuit 17 lead for high beam or circuit 18 lead for low beam). Check resistance from terminal on light to ground. If reading is 0 ohms or infinity, replace defective lamp (para 2-124). Test 2. Disconnect circuit 17 lead (high beam) at headlight. Check resistance from end of lead to socket F in plug C-10. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. To check low beam circuit continuity, disconnect circuit 18 lead at headlight. Check resistance from end of lead to socket E in plug C-10. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 3. If both headlights are inoperative on one beam, disconnect plug C-10 from beam selecting switch. Check resistance from pin G of beam selecting switch to pin F for high beam and pin G to pin E for low beam. Reading should alternately be 0 ohms and infinity as switch is depressed. If reading remains at infinity, replace defective switch (para 2-126). If reading is correct, wiring harness is defective; notify direct support maintenance personnel. Test 4. Disconnect cable at plugs C-10 and C-9. Check resistance from socket G in plug C-10 to socket M in plug C-9. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 5. Disconnect circuit 10 lead at bus bar, and disconnect cable at plug C-9. Check resistance from socket F in plug C-9 to end of lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 6. If defect has not been found up to this point, replace defective light selector switch assembly (para 2-128). Test 7. If one headlight is inoperative on both beams, replace defective lamp unit (para 2-124). Test 8. If both headlights are inoperative on both beams, check resistance at beam selecting switch receptacle C-10 between pins G and F for high beam and pins G and E for low beam. Reading should alternately be 0 ohms and infinity as switch is depressed. If reading does not change, replace defective switch (para 2-126).
5. Infrared headlight or headlights inoperative on one or both beams.	Test 1. If one headlight is inoperative on one beam, disconnect lead for that beam at headlight (circuit 514 lead for high beam or circuit 515 lead for low beam). Check resistance from terminal on light to ground. If reading is 0 ohms or infinity, replace defective lamp (para 2-124). Test 2. Disconnect circuit 514 lead (high beam) at headlight. Check resistance from end of lead to pin B in plug C-10. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. To check low beam circuit continuity, connect circuit 515 lead at headlight. Check resistance from end of lead to socket A in plug C-10. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 3. If both headlights are inoperative on one beam, disconnect plug C-10 from beam selecting switch. Check resistance from pin C in switch to pin B for high beam and pin C to pin A for low beam. Reading should alternately be 0 ohms and infinity as switch is depressed. If reading remains at infinity, replace defective switch (para 2-126). Test 4. Disconnect cable at plug C-10, and disconnect circuit 514 and 515 leads at infrared-blackout selector switch. Check

Table 2-7. Horn and Lighting System Electrical Troubleshooting—Continued

Horn and lighting system Malfunction	Tests
5. Continued	resistance from socket C in plug C-10 to terminal at selector switch. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 5. Disconnect circuit 515 and 514 leads from infrared-blackout selector switch. Disconnect circuit 520 lead from infrared-blackout selector switch. Check resistance through switch. With switch in infrared position, reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-127). Test 6. Disconnect circuit 520 lead from infrared-blackout selector switch and plug C-9 from light selector switch assembly. Check resistance from end of circuit 520 lead to socket D in plug C-9. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 7. Disconnect circuit 10 lead at bus bar and plug C-9 at light selector switch assembly. Check resistance from socket F at plug C-9 to end of circuit 10 lead at bus bar. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 8. If defect has not been found up to this point, replace defective light selector switch assembly (para 2-128). Test 9. If one headlight is inoperative on both beams, replace defective lamp unit (para 2-124). Test 10. If both infrared headlights are inoperative on one beam, disconnect plug C-10 from beam selecting switch. Check resistance from pin C of switch to pin B for high beam and pin C to pin A for low beam. Reading should alternately be 0 ohms and infinity as switch is depressed. If reading remains at infinity, replace defective switch (para 2-126). If reading is correct, wiring harness is defective; notify direct support maintenance personnel. Test 11. If both infrared headlights are inoperative on both beams, check resistance between beam selecting switch, receptacle C-10, pin C and pin B for high beam, and pin C to pin A for low beam. Reading should alternately be 0 ohms and infinity as switch is depressed. If reading remains at infinity, replace defective switch (para 2-126). If beam selecting switch is not defective, perform test 5 above.
6. Blackout headlight inoperative	Test 1. Disconnect circuit 19 lead from blackout headlight. Check resistance from terminal on lamp to carrier ground. If reading is 0 ohms or infinity, replace defective lamp (para 2-123). Test 2. Disconnect circuit 19 lead at headlight and infrared-blackout selector switch. Check lead resistance. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 3. Disconnect circuit 19 lead and circuit 520 lead at infrared-blackout selector switch. Check resistance through switch with switch in blackout position. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-127). Test 4. Perform test 6, malfunction 5, above. Test 5. Perform test 7, malfunction 5, above. Test 6. Perform test 8, malfunction 6, above.
7. Front blackout marker light or lights inoperative.	Test 1. Disconnect circuit 20 lead at blackout marker light assembly. Check resistance from lamp terminal to carrier ground. If reading is 0 ohms or infinity, replace defective lamp (para 2-122). Test 2. Disconnect circuit 20 lead at blackout marker light assembly and plug C-9 at light selector switch assembly. Check resistance from circuit 20 lead at lamp to socket E in C-9 plug. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.

Table 2-7. Horn and Lighting System Electrical Troubleshooting—Continued

Horn and lighting system malfunction	Tests
7. Continued	Test 3. Perform test 5, malfunction 4, above. Test 4. If defect has not been found up to this point, replace defective light selector switch assembly (para 2-128).
8. Rear blackout marker light or lights inoperative.	Test 1. Test lamp. Place probes on center terminal and side of metal base, and check lamp resistance. Same resistance should be indicated. If reading is 0 ohms or infinity, replace defective lamp (para 2-122). Test 2. Disconnect circuit 24 lead at blackout marker light assembly. Check resistance from lamp terminal to carrier ground. If reading is 0 ohms or infinity, replace defective light assembly (para 2-122). Test 3. Disconnect circuit 24 lead at rear of blackout marker light assembly (at both lights if both lights are inoperative) and plug C-9. Check resistance of circuit 20-24 lead (or leads) from light to socket E in plug C-9. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 4. Perform test 5, malfunction 4, above. Test 5. If defect has not been found up to this point, replace defective light selector switch assembly (para 2-128).
9. Service stop light inoperative	Test 1. Test lamp. Place probes on center terminal and side of metal base, and check bulb resistance. Some resistance should be indicated. If reading is 0 ohms or infinity, replace defective lamp (para 2-120). Test 2. Disconnect service stop light circuit 22 lead at lamp. Check resistance from lamp terminal to carrier ground. If reading is 0 ohms or infinity, replace defective lamp assembly (para 2-120). Test 3. Disconnect circuit 75 and 75A leads from carrier stop light switch. Place switch in ON position. Check resistance through switch. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-120). Test 4. Disconnect plug C-9 from selector switch and circuit 75 lead from carrier stop light switch. Check resistance from socket K in plug C-9 to end of circuit 75 lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 5. Disconnect circuit 22 lead at taillight assembly and plug C-9. Check resistance from end of lead to socket C in plug C-9. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 6. Disconnect circuit 75A lead from stop light switch, and disconnecting plug C-9 from light selector switch. Check resistance from socket A in plug C-9 to end of circuit 75A lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 7. Perform test 5, malfunction 4, above. Test 8. If defect has not been found up to this point, replace defective light selector switch (para 2-128).
10. Blackout stop light inoperative with service stop light operating normally.	Test 1. Test lamp. Place probes on bulb terminal and metal base, and check resistance. Reading should indicate some resistance. If reading is 0 ohms or infinity, replace defective lamp (para 2-121). Test 2. Disconnect stop light circuit 23 lead from stop light. Check resistance from terminal on lamp to carrier ground. If reading is 0 ohms or infinity, replace defective lamp assembly (para 2-121). Test 3. Disconnect circuit 23 lead at stop light and plug C-9 at light selector switch assembly. Check resistance from end of lead to socket N in plug C-9. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.

Table 2-7. Horn and Lighting System Electrical Troubleshooting— Continued

Horn and lighting system malfunction	Tests
10. Continued	Test 4. If defect has not been found up to this point, replace defective light selector switch assembly (para 2-128).
11. Cab bright dome light does not glow.	Test 1. Test lamp. Remove bright dome light lamp. Check resistance from center contact to metal body of lamp. Reading should indicate some resistance. If reading is infinity, replace defective lamp (para 2-125).
	Test 2. Place light switch in bright dome light position. Disconnect circuit 38 lead at dome light. Check resistance from circuit 38 lead terminal to lamp socket terminal. Reading should be 0 ohms. If any other reading is obtained, switch is defective; replace dome light (para 2-125). Place switch in OFF position and repeat test. Reading should be infinity. If any other reading is obtained, switch is defective; replace dome light (para 2-125).
	Test 3. Disconnect circuit 38 lead at dome light and circuit 27 lead at instrument panel circuit breaker. Check resistance of disconnected leads. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
	Test 4. Test circuit breaker. Refer to test 6, malfunction 1.
	Test 5. Check circuit 10 lead for continuity. Refer to test 7, malfunction 1.
12. Cab blackout dome light does not glow.	Test 1. Test lamp. Remove blackout lamp. Check resistance from center contact to metal body of lamp. Reading should indicate some resistance. If reading is infinity, replace defective lamp (para 2-125).
	Test 2. Place light switch in blackout position. Disconnect circuit 38 lead at dome light. Check resistance from circuit 38 lead terminal to center contact of lamp socket. Reading should be 0 ohms. If any other reading is obtained, switch is defective; replace dome light (para 2-125). Place switch in OFF position and repeat test. Reading should be infinity. If any other reading is obtained, switch is defective; replace dome light (para 2-125).
	Test 3. Check wiring. Refer to test 3, malfunction 11.
	Test 4. Test circuit breaker. Refer to test 6, malfunction 1.
	Test 5. Check circuit 10 lead for continuity. Refer to test 7, malfunction 1.
13. Trailer electric coupling receptacle inoperative.	Test 1. Place light selector switch in STOP LIGHT position. Depress brake pedal. Check voltage from socket B in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 13.
	Test 2. Place light selector switch in SER DRIVE position. Depress brake pedal. Check voltage from socket B in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 13.
	Test 3. Place light selector switch in SER. DRIVE position. Check voltage from socket E in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 9.
	Test 4. Place light selector switch in B.O. MARKER position. Depress brake pedal. Check voltage from socket F in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 11.
	Test 5. Place light selector switch in B.O. MARKER position. Check voltage from sockets C and A in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 15.
	Test 6. Place light selector switch in B.O. DRIVE position. Depress brake pedal. Check voltage from socket F in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 11.
	Test 7. Place light selector switch in B.O. DRIVE position. Check

Table 2-7. Horn and Lighting System Electrical Troubleshooting—Continued

Horn and lighting system malfunction	Tests
13. Continued	voltage from sockets A and C in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 15. Test 8. Check resistance from socket D and L in trailer receptacle to carrier ground. Reading should be 0 ohms. If reading is infinity, receptacle or wiring harness is defective; notify direct support maintenance personnel. Test 9. Disconnect plug C-9 at light selector switch and circuit 21 lead at trailer wiring harness. Check resistance from socket H in plug C-9 through disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 10. Disconnect circuit 21 lead at main wiring harness junction. Check resistance from socket E in trailer receptacle to disconnected end of circuit 21 lead. Reading should be 0 ohms. If any other reading is obtained, wiring harness or trailer receptacle is defective; notify direct support maintenance personnel. Test 11. Disconnect plug C-9 at light selector switch and circuit 23 lead at trailer wiring harness. Check resistance from socket N in plug C-9 through disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 12. Disconnect circuit 23 lead at main wiring harness junction. Check resistance from socket F in trailer receptacle to disconnected end of circuit 23 lead. Reading should be 0 ohms. If any other reading is obtained, wiring harness or trailer receptacle is defective; notify direct support maintenance personnel. Test 13. Disconnect plug C-9 at light selector switch and circuit 22 lead at trailer wiring harness. Check resistance from socket C in plug C-9 through disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 14. Disconnect circuit 22 lead at main wiring harness junction. Check resistance from socket B in trailer receptacle to disconnected end of circuit 22 lead. Reading should be 0 ohms. If any other reading is obtained, wiring harness or trailer receptacle is defective; notify direct support maintenance personnel. Test 15. Disconnect plug C-9 at light selector switch and circuit 24 lead at trailer wiring harness. Check resistance from socket E in plug C-9 through disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 16. Disconnect circuit 24 lead at main wiring harness junction. Check resistance from sockets C and A in trailer receptacle to disconnected end of circuit 24 lead. Reading should be 0 ohms. If any other reading is obtained, wiring harness or trailer receptacle is defective; notify direct support maintenance personnel.

2-24. Power Plant Electrical System

a. *Operational Description.* The power plant electrical system consists of the instrument panel circuit breaker, engine oil low pressure warning light, engine oil low pressure switch, transmission oil high temperature warning light, transmission oil high temperature switch, differential oil high

temperature warning light, differential oil high temperature switch, engine coolant temperature indicator, engine coolant temperature transmitter, air box heater switch, air box heater coil, air box heater fuel solenoid valve, air box heater ignitor plug, and connecting leads. The air box heater switch controls the air box heater coil, solenoid

valve, and ignitor plug which ignites fuel in the engine air box to warm the engine for starting. The high temperature warning lights are controlled by the engine, transmission, and differential oil high temperature switches, 24-volt power is supplied by two 12-volt batteries connected in series, located under the driver's seat. Power is controlled by the master switch, located on the battery bulkhead.

b. Functional Description.

(1) With the master switch OFF and engine not running, the condition of the power plant electrical system is as follows:

- (a) Batteries are charged.
- (b) Master switch is open.
- (c) Instrument panel circuit breaker is closed.
- (d) Differential and transmission oil high temperature warning lights are off.
- (e) Engine oil low pressure warning light is off.
- (f) Engine coolant temperature indicator is de-energized.
- (g) Differential and transmission oil high temperature switches are open and voltage is applied.
- (h) Engine oil low pressure switch is closed and voltage is applied.
- (i) Engine coolant temperature transmitter has no voltage applied.
- (j) Air box heater switch has no voltage applied.
- (k) Air box heater ignition coil is de-energized.
- (l) Air box heater ignitor is de-energized.
- (m) Air box heater fuel solenoid valve is de-energized and closed.

(2) With the master switch ON and engine not running, the condition of the power plant electrical system is as follows:

- (a) Batteries are charged.
- (b) Master switch is closed.
- (c) Instrument panel circuit breaker is closed.
- (d) Differential and transmission oil high temperature warning lights are off.
- (e) Engine oil low pressure warning light is on.
- (f) Engine coolant temperature indicator is energized and indicating coolant temperature.
- (g) Differential and transmission oil high temperature switches are open with voltage applied.
- (h) Engine oil low pressure switch is closed with voltage applied.
- (i) Engine coolant temperature transmitter is energized.
- (j) Voltage is applied to air box heater switch which is open or closed, depending on position of switch.
- (k) Air box heater ignition coil is de-energized when switch is released or energized when switch is depressed.
- (l) Air box heater ignitor is de-energized when switch is released or energized when switch is depressed.
- (m) Air box heater fuel solenoid valve is de-energized when switch is released or energized when switch is depressed. The valve is open when solenoid is energized and closed when solenoid is de-energized.

c. Troubleshooting. Refer to table 2-8 and see figure 2-9 for troubleshooting the power plant electrical system. Test are given in order of probable component or circuit malfunction and should be checked in that order during troubleshooting.

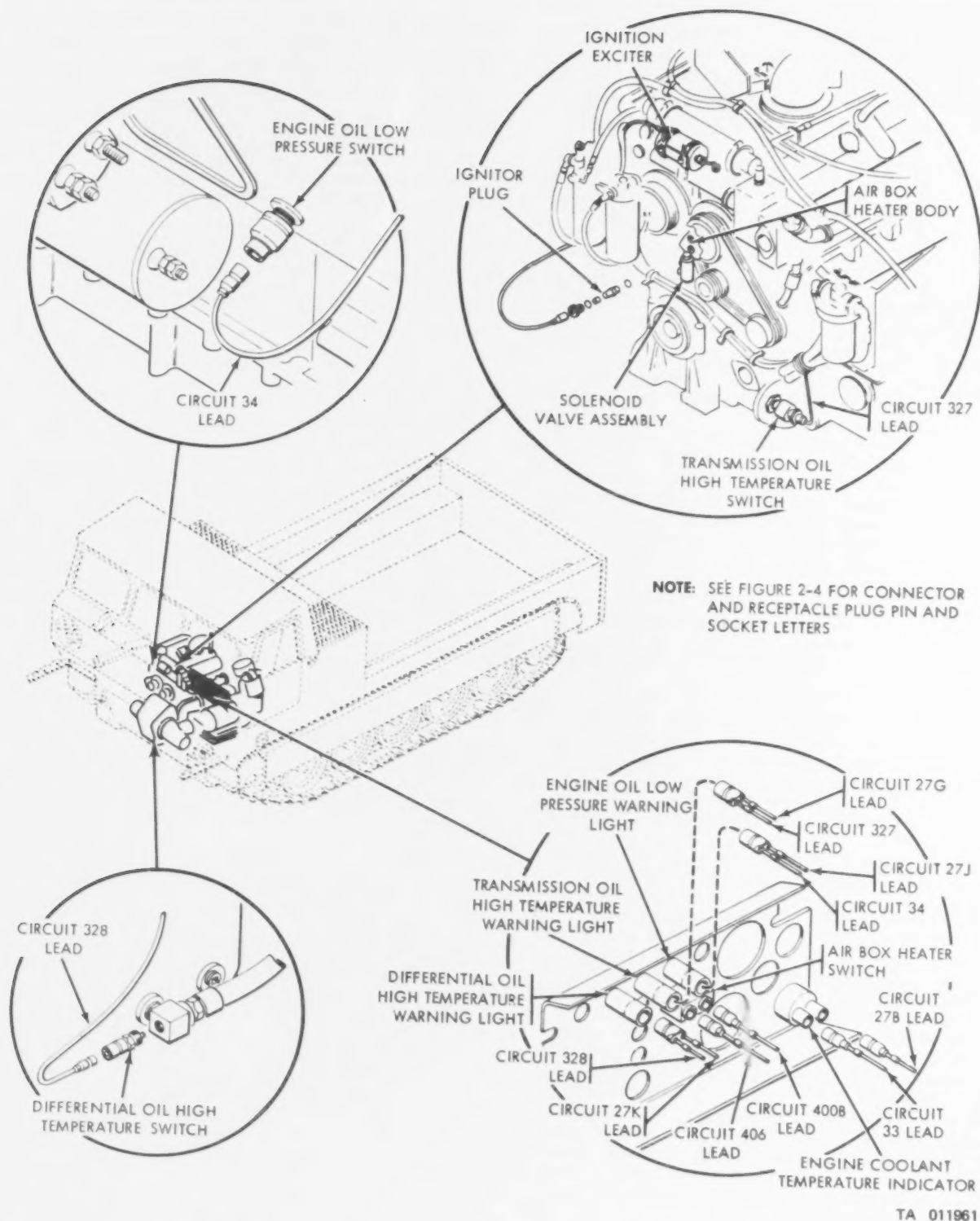
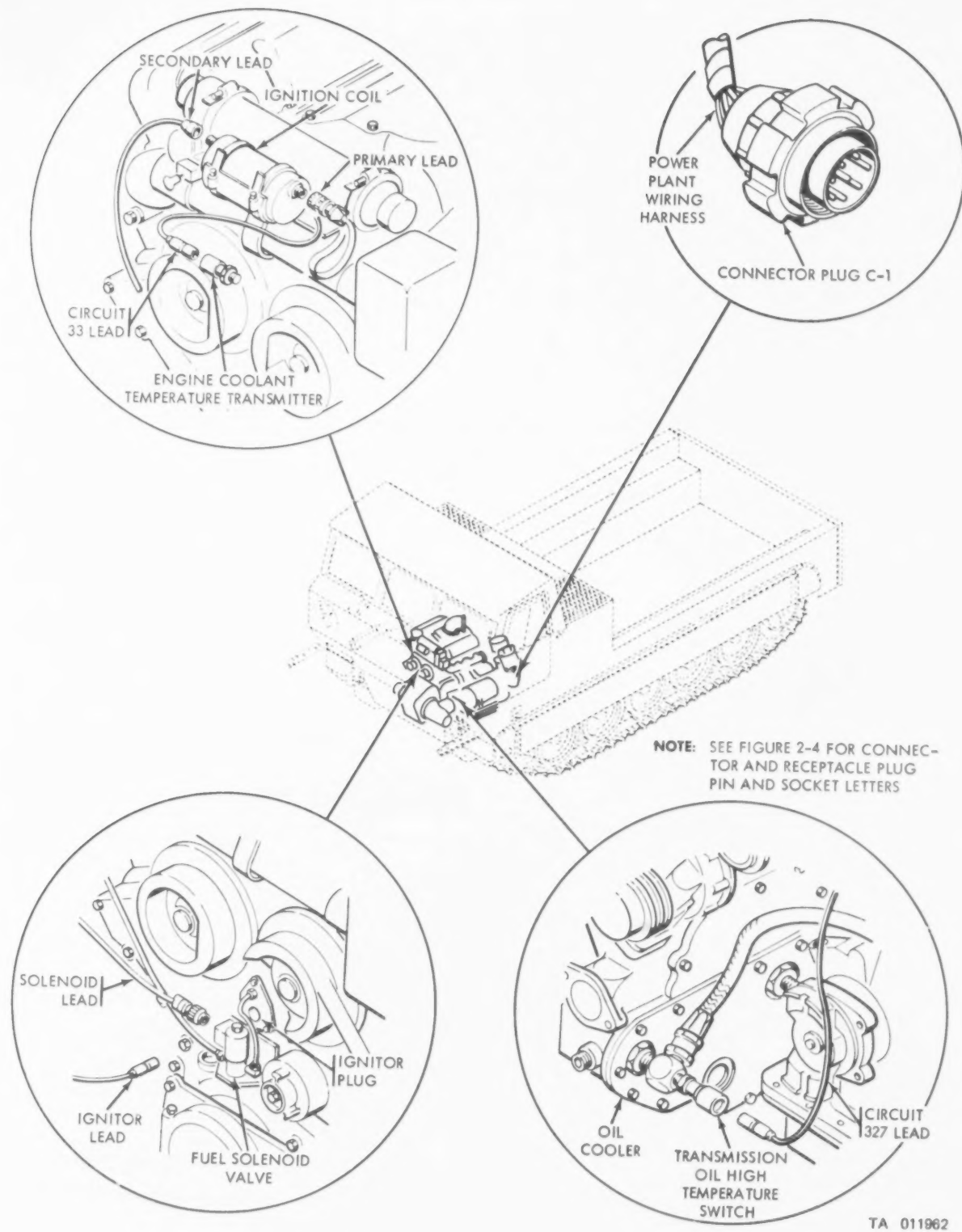


Figure 2-9. Power plant electrical system (sheet 1 of 2).



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Figure 2-9. Power plant electrical system (sheet 2 of 2).

2-25. Fuel Electrical System

a. *Operational Description.* The fuel electrical system consists of the instrument panel circuit breaker, fuel pump switch, two fuel pump circuit breakers, two electric fuel pumps, a fuel quantity transmitter, fuel quantity indicator, and connecting

leads. The fuel pump switch controls the operation of the two fuel pumps to assure a constant flow of fuel to the air separator tank. The fuel quantity indicator shows the quantity of fuel in the fuel compartment as transmitted by the rise and fall of the transmitter float.

Table 2-8. Power Plant Electrical System Troubleshooting

Power plant system malfunction	Tests
1. Engine oil low pressure warning light fails to go on.	Test 1. Test lamp. Check resistance from center contact to side of metal body on lamp. If reading is infinity, replace defective lamp (para 2-94). Test 2. Disconnect circuit 34 lead from engine oil low pressure switch. Check resistance from connector through switch to ground. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-132). Test 3. Disconnect circuit 27J and 34 leads at engine oil low pressure warning light. With lamp installed, check resistance through indicator. Reading should be 0 ohms. If reading is 0 ohms or infinity, replace defective indicator light assembly. Test 4. Disconnect plug C-1 at bulkhead and circuit 34 lead from engine oil low pressure switch. Check resistance from end of circuit 34 lead to pin D in plug C-1. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 5. Disconnect plug C-1 at bulkhead and circuit 34 lead at engine oil low pressure warning light assembly. Check resistance from socket D in plug C-1 end of lead at indicator. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 6. Disconnect circuit 27J lead from engine oil low pressure indicator light and circuit breaker. Check resistance of circuit 27J lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel.
2. Engine oil low pressure warning light fails to go off after engine starts.	Test 1. Disconnect circuit 34 lead from engine oil low pressure switch. Put probe on contact and ground. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-132). Test 2. If defect has not been found in test 1, wiring harness is shorted; notify direct support maintenance personnel.
3. Differential oil high temperature warning light is on, differential not overheating.	Test. Replace differential oil high temperature switch. If light stays on, wiring harness is defective; notify direct support maintenance personnel.
4. Differential oil high temperature light fails to go on; differential is overheating.	Test 1. Test lamp. Check resistance from center contact to side of metal body on lamp. If reading is infinity, replace defective lamp (para 2-94). Test 2. Disconnect circuit 328 lead from differential oil high temperature switch. Check resistance through switch to ground while high temperature condition prevails. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-134). Test 3. Disconnect circuit 27K and 328 leads from differential oil high temperature warning light assembly. Check resistance through assembly with bulb installed. Reading should indicate some resistance. If reading is 0 ohms or infinity, replace defective light assembly (para 2-93). Test 4. Disconnect circuit 328 lead from differential oil high temperature switch and differential oil high temperature warning light. Check resistance of circuit 328 lead. Reading should be 0 ohms. If reading is infinity, proceed to tests 5 and 6.

Table 2-8. Power Plant Electrical System Troubleshooting—Continued

Power plant system malfunction	Tests
4. Continued	Test 5. Disconnect circuit 328 lead at plug C-1 at bulkhead, and at differential oil high temperature switch. Check resistance from pin A to end of lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 6. Disconnect circuit 328 lead from differential oil high temperature warning light assembly. Check resistance from socket A in plug C-1 to end of lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 7. Disconnect circuit 27 lead at accessories circuit breaker and circuit 27K lead at differential oil high temperature warning light assembly. Check resistance of circuit 27K and 27 leads. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel.
5. Transmission oil high temperature warning light is on, transmission not overheating.	Test. Replace transmission oil high temperature switch (para 2-135). If this does not solve malfunction, wiring harness is defective; notify direct support maintenance personnel.
6. Transmission oil high temperature warning light fails to go on; transmission is overheating.	Test 1. Test lamp. Check resistance from center contact to metal body of lamp. If reading is infinity, replace defective lamp (para 2-94). Test 2. Disconnect circuit 327 lead from transmission oil high temperature switch. Check resistance through switch to ground while high temperature condition prevails. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-135). Test 3. Disconnect circuit 27G and 327 leads from transmission oil high temperature indicator. With lamp inserted, place probes on exposed pins and check resistance through indicator. Reading should indicate some resistance. If reading is infinity, replace defective indicator (para 2-94). Test 4. Disconnect circuit 327 lead at transmission oil high temperature switch and at transmission oil high temperature indicator. Check resistance of circuit 327 lead. Reading should be 0 ohms. If reading is infinity, proceed to tests 5 and 6. Test 5. Disconnect plug C-1 at bulkhead and circuit 327 lead at transmission oil high temperature switch. Check resistance from pin G in plug C-1 to end of lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 6. Disconnect plug C-1 at bulkhead and circuit 327 lead at transmission oil high temperature indicator. Check resistance of circuit 327 lead from socket G in receptacle C-1 to end of lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 7. Disconnect circuit 27G lead at transmission oil high temperature indicator and circuit 27 lead at instrument panel circuit breaker. Check resistance of disconnected leads. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
7. Engine coolant temperature indicator fails to register or registers incorrectly.	Test 1. Disconnect circuit 33 lead from engine coolant temperature transmitter. Check resistance of connector through fuel level sensor to ground. Reading should be 200 to 2,500 ohms. If reading is 0 ohms or infinity, replace defective transmitter (para 2-133). Test 2. Disconnect circuit 27B and 33 leads at engine coolant temperature indicator. Check resistance across indicator. Reading should be 200 to 2,500 ohms. If reading is 0 ohms or infinity, replace defective indicator (para 2-93). Test 3. Disconnect circuit 33 lead from engine coolant temperature indicator and engine coolant temperature transmitter. Check resistance of circuit 33 lead. Reading should be 0 ohms. If

Table 2-8. Power Plant Electrical System Troubleshooting—Continued

Power plant system malfunction	Tests
7. Continued	reading is infinity, notify direct support maintenance personnel.
8. Air box ignitor fails to fire because of electrical malfunction.	Test 4. Disconnect circuit 27 lead at instrument panel circuit breaker and circuit 27B lead at ending coolant temperature indicator. Check resistance of disconnected leads. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
	Test 1. Disconnect primary and secondary circuit leads from ignition coil. Check resistance from primary terminal to carrier ground. Reading should be approximately 0.8 ohm. Check resistance from secondary terminal to carrier ground. Reading should be 550 to 650 ohms. If any other reading is obtained, replace defective ignition coil (para 2-64).
	Test 2. Disconnect circuit 400B and 406 leads at air box heater switch. Place switch in ON position and check resistance through switch. Reading should be 0 ohms. Place switch in OFF position and check resistance through switch. Reading should be infinity. If any other readings are obtained, replace defective switch (para 2-71).
	Test 3. Disconnect circuit 406 lead at air box heater switch, at fuel solenoid valve and at ignitor plug. Check resistance of disconnected lead. Reading should be 0 ohms. If reading is infinity, proceed to tests 5 and 6.
	Test 4. Disconnect circuit 406 lead at air box heater switch and disconnect plug C-1 at bulkhead. Check resistance from socket C in plug C-1 to end of lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
	Test 5. Disconnect plug C-1 at bulkhead and disconnect circuit 406 lead at fuel line solenoid and at ignition exciter. Check resistance from pin C in plug C-1 to end of lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
	Test 6. Disconnect circuit 400B lead at air box heater switch and circuit 27 lead at instrument panel circuit breaker. Check resistance of disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
	Test 7. Disconnect circuit 406 lead at fuel line solenoid valve. Check resistance from terminal to ground. Reading should indicate some resistance. If reading is infinity, solenoid is defective; replace solenoid valve assembly (para 2-69).
	Test 8. If defect has not been found up to this point, ignitor plug is defective; replace ignitor (para 2-70).

b. Functional Description.

(1) With the master switch OFF, the condition of the fuel electrical system is as follows:

- (a) Batteries are charged.
- (b) Master switch is open.
- (c) Instrument panel circuit breaker is closed and no voltage is applied.
- (d) Fuel quantity indicator is de-energized.
- (e) Fuel pump switch has no voltage applied.
- (f) Fuel pump circuit breakers are closed and no voltage is applied.
- (g) Fuel pumps are de-energized.
- (h) Fuel quantity transmitter is de-energized.

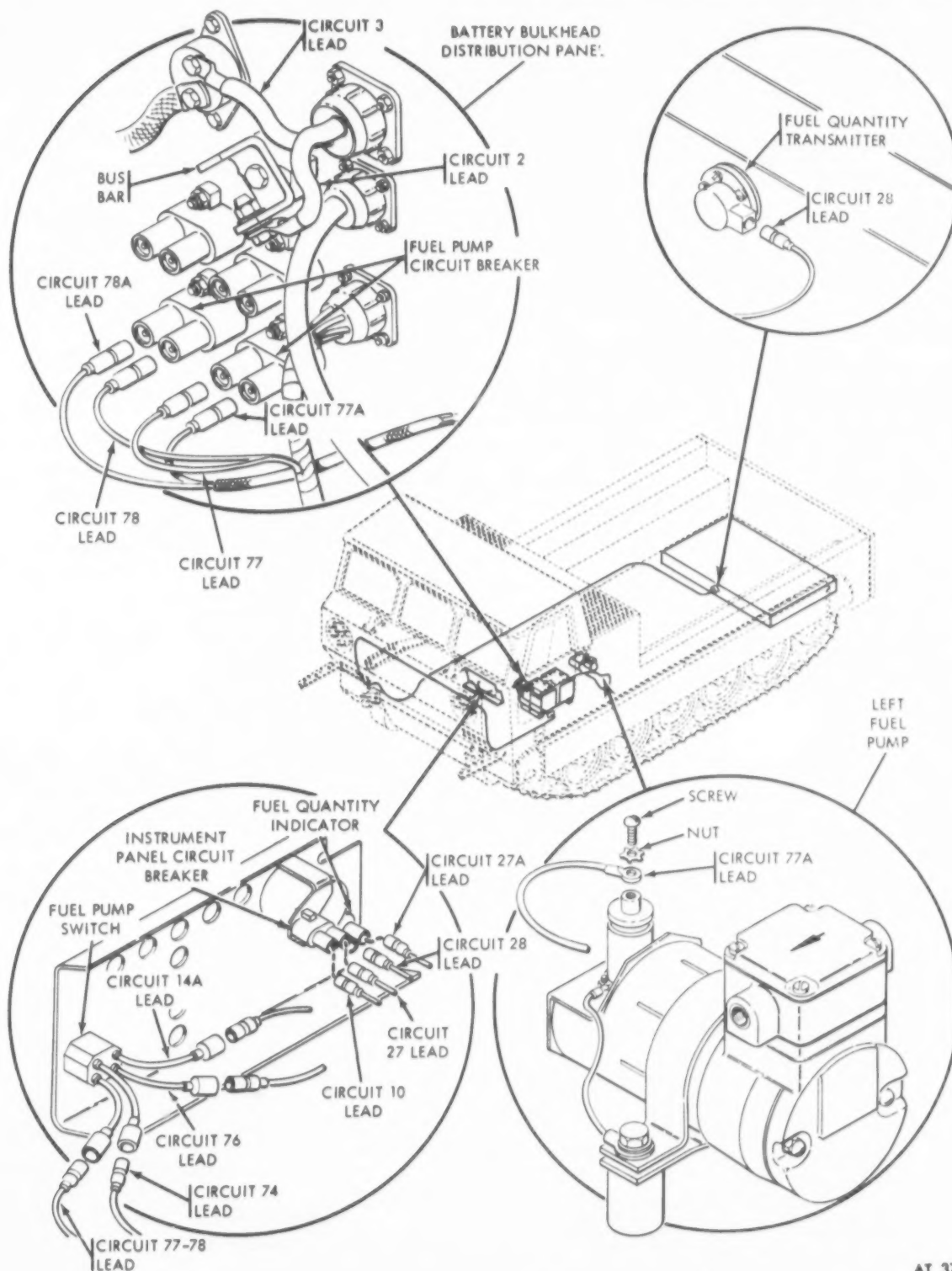
(2) With the master switch ON, the condition of the fuel electrical system is as follows:

- (a) Batteries are charged.
- (b) Master switch is closed.
- (c) Instrument panel circuit breaker is closed and energized.
- (d) Fuel quantity indicator is energized and indicating amount of fuel.
- (e) Fuel pump switch has voltage applied.
- (f) Fuel pump circuit breakers are closed and energized if switch is closed.
- (g) Fuel pumps are energized if switch is closed.
- (h) Fuel quantity transmitter is energized.

c. Troubleshooting. Refer to table 2-9 and

figure 2-10 for troubleshooting the fuel electrical system. Tests are given in order of probable

component or circuit malfunction and should be checked in that order during troubleshooting.



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Figure 2-10. Fuel electrical system.

2-26. Bilge Pump Electrical System

a. Operational Description. The bilge pump electrical system consists of a front bilge pump in the power plant compartment and a rear bilge pump under the floor plates at the rear of the cargo compartment; bilge pump switch, located on the instrument panel; front and rear bilge pump in-

dicators, located on the instrument panel; front and rear bilge pump circuit breakers, located on the distribution panel.

b. Functional Description.

(1) With the master switch OFF, the condition of the bilge pump electrical system is as follows:

Table 2-9. Fuel Electrical System Troubleshooting

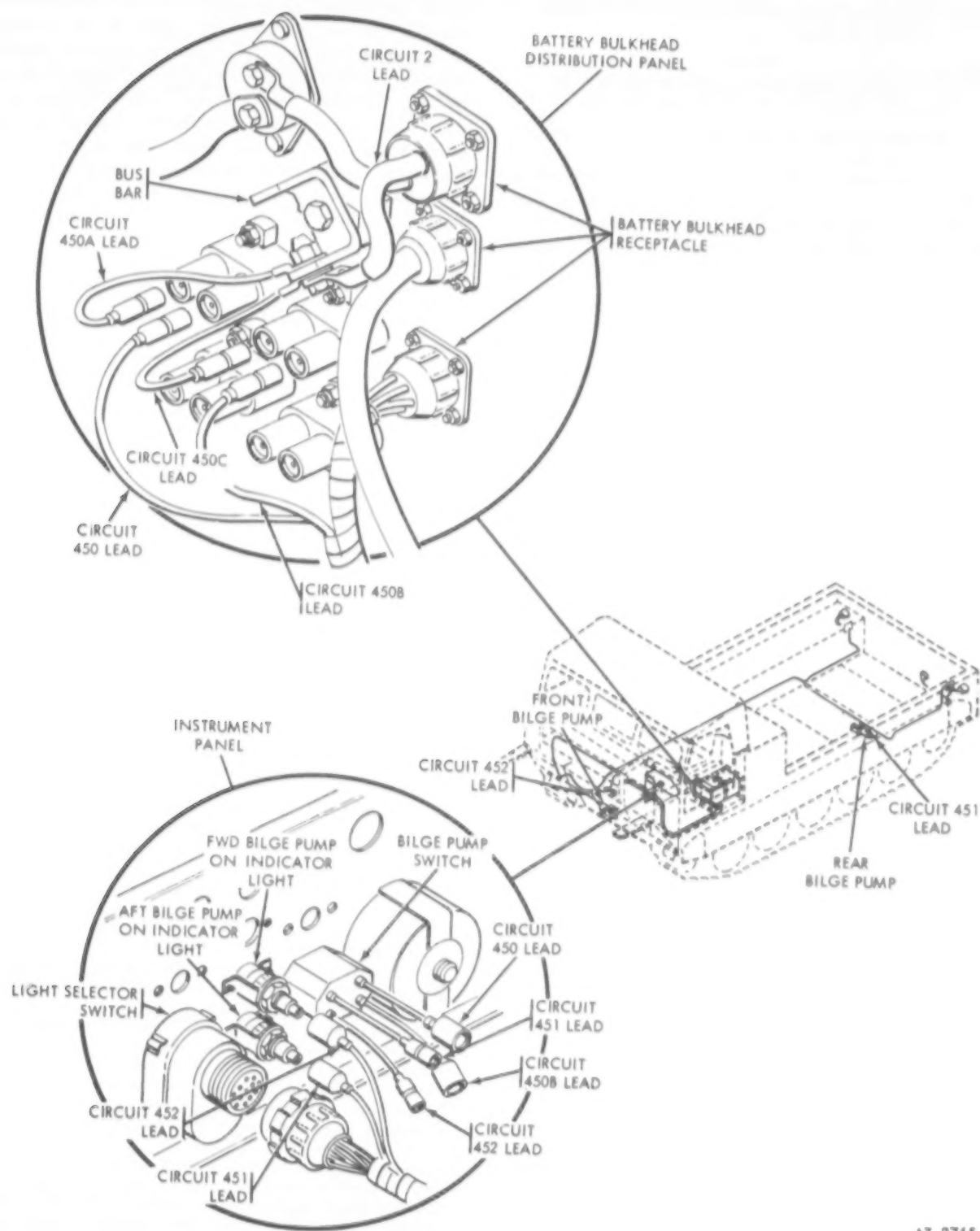
Fuel system malfunction	Tests
1. Fuel quantity indicator inoperative	Test 1. Disconnect circuit 28 lead from fuel quantity transmitter. Check resistance from circuit 28 lead through transmitter to ground. Reading should be 0 to 3.5 ohms, depending on amount of fuel in tank. If reading is not in above range, replace defective transmitter (para 2-60). Test 2. Disconnect circuit 28 and 27A leads at fuel quantity indicator. Check resistance across indicator. Reading should be 250 ohms. If reading is 0 ohms or infinity, replace defective indicator (para 2-61). Test 3. Disconnect circuit 28 lead at fuel quantity transmitter and at fuel quantity indicator. Check resistance of circuit 28 lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 4. Disconnect circuit 27A lead at fuel quantity indicator and circuit 27 lead at instrument panel circuit breaker. Check resistance of circuit 27 and 27A leads. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 5. Disconnect circuit 27 lead and circuit 10 lead from instrument panel circuit breaker. Check resistance through circuit breaker. Reading should be 0 ohms. If reading is infinity, replace defective circuit breaker (para 2-95). Test 6. Disconnect circuit 10 lead at instrument panel circuit breaker and at carrier bus bar. Check resistance of disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
2. Fuel pumps inoperative when fuel pump switch is placed in ON position.	Test 1. Disconnect circuit 78A lead from right fuel pump. Check resistance from connector through pump motor to carrier ground. Reading should indicate some resistance. If reading is 0 ohms or infinity, replace defective fuel pump (para 2-48). Test 2. Disconnect circuit 77A lead from left fuel pump. Check resistance from connector through pump motor to carrier ground. Reading should indicate some resistance. If reading is 0 ohms or infinity, replace defective fuel pump (para 2-48). Test 3. Disconnect circuit 76 lead and circuit 77-78 lead from fuel pump switch. With switch in ON position, check resistance through switch. Reading should be 0 ohms. Place switch in OFF position. Reading should be infinity. If any other readings are obtained, replace defective switch (fig. 2-50). Test 4. Disconnect circuit 76 lead at bus bar and at instrument panel switch. Check resistance through lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 5. Disconnect circuit 77-78 leads at instrument panel switch and at circuit breakers. Check resistance through disconnected leads. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 6. Disconnect circuit 77 lead and circuit 77A lead at circuit breaker. Check resistance through circuit breaker. Reading should be 0 ohms. If any other reading is obtained, replace defective circuit breaker (para 2-51).

Table 2-9. Fuel Electrical System Troubleshooting—Continued

Fuel system malfunction	Tests
2. Continued	Test 7. Disconnect circuit 78A lead and circuit 78 lead at circuit breaker. Check resistance through circuit breaker. Reading should be 0 ohms. If any other reading is obtained, replace defective circuit breaker (para 2-51).

- (a) Batteries are charged.
 - (b) Bus bar on distribution panel has no voltage applied.
 - (c) Both bilge pump circuit breakers are closed and de-energized.
 - (d) Bilge pump switch is open.
 - (e) Bilge pump indicators are off.
 - (f) Bilge pumps are de-energized.
- (2) With the master switch ON, the condition of the bilge pump electrical system is as follows:
- (a) Batteries are charged.
 - (b) Bus bar on distribution panel has voltage applied.

- (c) Both bilge pump circuit breakers are closed and energized when bilge pump switch is on.
 - (d) Bilge pump switch has voltage applied.
 - (e) Bilge pump indicators are on when bilge pump switch is on.
 - (f) Bilge pumps are energized when bilge pump switch is on.
- c. *Troubleshooting.* Refer to table 2-10 and see figure 2-11 for troubleshooting the bilge pump electrical system. Tests are given in order of probable component or circuit malfunction and should be checked in that order during troubleshooting.



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Figure 2-11. Bilge pump electrical system.

2-27. Carrier Hull and Miscellaneous Electrical System

NOTE

The radio receptacle has been deleted on carriers after C-143, and circuit 400 is attached to the carrier bus bar in place of circuit 48.

a. *Operational Description.* The hull and miscellaneous electrical system consists of the instrument panel circuit breaker; windshield wiper switch, located on the instrument panel; wind-

shield wiper motor, located below the windshield; auxiliary power receptacle, located on the battery bulkhead adjacent to the master switch; utility outlet receptacle, located on the instrument panel; radio receptacle, located in the front of the carrier; trailer electric coupling receptacle, located on the tailgate; and connecting leads. The utility outlet receptacle and radio receptacle are energized when the master switch is on. The windshield wiper switch controls the operation of the windshield wiper motor.

Table 2-10. Bilge Pump Electrical System Troubleshooting

Bilge pump system malfunction	Tests
1. Both bilge pumps inoperative with switch ON.	Test 1. Operate starter to check battery condition. If batteries are good, proceed to test 2. Test 2. Disconnect circuit 452 lead at front bilge pump and circuit 451 lead at rear bilge pump. Place bilge pumps switch in ON position and check voltage at disconnected leads. Reading should be 20 to 28 volts. If reading is satisfactory, proceed to test 3. If circuit leads are dead, proceed to test 4. Test 3. Check resistance through bilge pump motor to ground. Reading should be 0.7 to 1.1 ohms. If reading is infinity, replace defective bilge pump (para 2-139). Test 4. Disconnect circuit 450 and 450B leads at bilge pumps switch. Check voltage at disconnected lead terminals. Reading should be 20 to 28 volts. If reading is satisfactory, proceed to test 5. If reading is 0 volts, proceed to test 7. Test 5. Disconnect circuit 451, 452, 450, and 450B leads from bilge pump switch. With switch in ON position, check resistance through both sides of switch. Reading should be 0 ohms. If reading is 0 ohms, proceed to test 6. If reading is infinity, replace defective switch (para 2-143). Test 6. Disconnect circuit 451 and 452 leads at front and rear bilge pumps and at bilge pump switch. Check resistance through disconnected leads. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 7. Disconnect circuit 450A and 450C leads at their respective circuit breakers. Check voltage at disconnected lead terminals. Reading should be 20 to 28 volts. If reading is satisfactory, proceed to test 8. If reading is 0 volts, proceed to test 10. Test 8. Disconnect circuit 450, 450B, 450A, and 450C leads from their respective circuit breakers. Check resistance through circuit breakers. Reading should be 0 ohms. If reading is infinity, replace defective circuit breaker(s) (para 2-144). If reading is 0 ohms, proceed to test 9. Test 9. Disconnect circuit 450, 450B, 451, and 452 leads at bilge pumps switch. Check resistance through leads. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 10. Check voltage at bus bar. Reading should be 20 to 28 volts. If reading is satisfactory, proceed to test 11. If reading is 0 volts, proceed to test 12. Test 11. Disconnect circuit 450A and 450C leads at bus bar and at their respective circuit breakers. Check lead resistance. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 12. Disconnect cable at bus bar and positive battery terminal. Check cable resistance. Reading should be 0 ohms. If reading is infinity, cable is defective; notify direct support maintenance personnel.

Table 2-10. Bilge Pump Electrical System Troubleshooting—Continued

Bilge pump system malfunction	Tests
2. Front bilge pump on indicator light fails to operate with switch ON (bilge pump is operating).	Test 1. Test bulb. Check resistance from center contact to metal body of bulb. If reading is infinity, replace defective bulb (para 2-142). Test 2. Disconnect circuit 452 lead at indicator light assembly. Check resistance from terminal to ground. If reading is 0 ohms or infinity, replace defective indicator light assembly (para 2-141). Test 3. Disconnect circuit 452 lead at indicator light assembly and at bilge pump. Put probe on each end. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
3. Rear bilge pump on indicator light fails to operate with switch ON (bilge pump is operating).	Test 1. Test bulb. Check resistance from center contact to metal body of bulb. If reading is infinity, replace defective bulb (para 2-141). Test 2. Disconnect circuit 451 lead at indicator light assembly. Check resistance from terminal to ground. If reading is 0 ohms or infinity, replace defective indicator light assembly (para 2-141). Test 3. Disconnect circuit 451 lead at indicator light assembly and at rear bilge pump. Put probe on each end. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.

b. Functional Description.

(1) With the master switch OFF, the condition of the hull and miscellaneous electrical system is as follows:

- (a) Batteries are charged.
- (b) Master switch is open.
- (c) Instrument panel circuit breaker is closed and no voltage is applied.
- (d) Auxiliary power receptacle has voltage applied.
- (e) Utility outlet has no voltage applied.
- (f) Radio receptacle has no voltage applied.
- (g) Trailer electric coupling receptacle has no voltage applied.
- (h) Windshield wiper switch has no voltage applied.
- (i) Windshield wiper motor is de-energized.

(2) With the master switch ON, the condition of the hull and miscellaneous electrical system is as follows:

- (a) Batteries are charged.

(b) Master switch is closed.

(c) Instrument panel circuit breaker is energized and closed.

(d) Auxiliary power receptacle has voltage applied.

(e) Utility outlet receptacle has voltage applied.

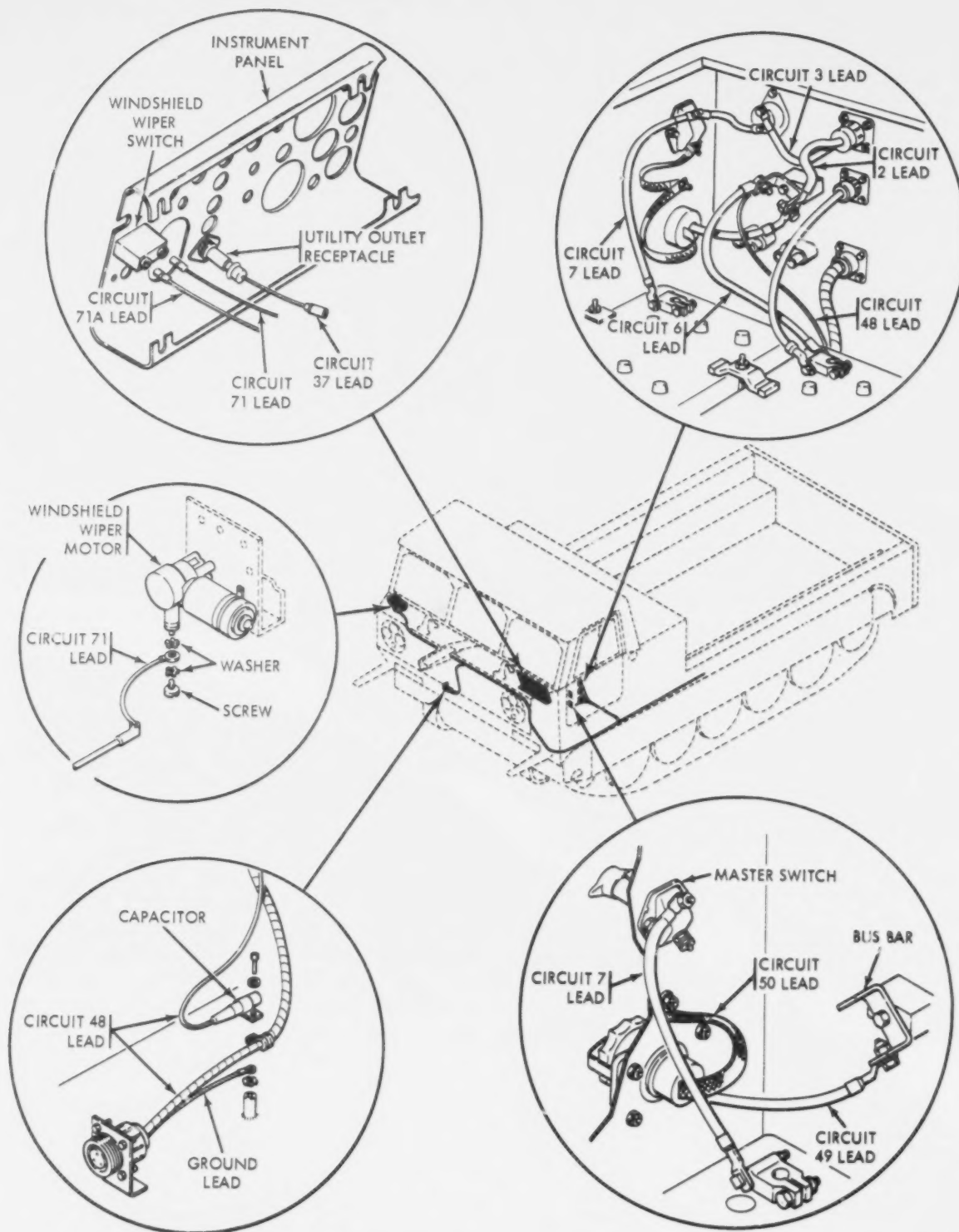
(f) Radio receptacle has voltage applied.

(g) Trailer electric coupling receptacle has voltage applied when the light selector switch is on.

(h) Windshield wiper switch has voltage applied.

(i) Windshield wiper motor is energized when the windshield wiper switch is on.

c. Troubleshooting. Refer to table 2-11 and see figure 2-12 for troubleshooting the hull and miscellaneous electrical system. Tests are given in order of probable component or circuit malfunction and should be checked in that order during troubleshooting.



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Figure 2-12. Carrier hull and miscellaneous electrical system.

Table 2-11. Carrier Hull and Miscellaneous Electrical System Troubleshooting

Carrier hull and miscellaneous electrical system malfunction	Tests
1. Auxiliary power receptacle inoperative.	Test 1. Turn master switch ON. Check voltage from battery bulkhead bus bar to ground. Reading should be 20 to 28 volts. If reading is less, check batteries (para 2-98). Test 2. Disconnect circuit 49 lead at bus bar and at auxiliary power receptacle. Check lead resistance. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 3. Disconnect circuit 50 lead at auxiliary receptacle and at ground connection. Check resistance of lead. Reading should be 0 ohms. If reading is infinity, notify direct support maintenance personnel. Test 4. If defect has not been found up to this point, replace defective receptacle (para 2-100).
2. Utility receptacle inoperative	Test 1. Check voltage from center contact to ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to tests 2 and 3. Test 2. Check voltage from receptacle socket to ground. Reading should be 0 volts. If voltage is indicated, replace defective receptacle (para 2-149). Test 3. Disconnect circuit 37 lead at utility receptacle and circuit 27 lead at instrument panel circuit breaker. Check resistance of leads. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
3. Trailer electric coupling receptacle inoperative.	Test 1. Place light selector switch in STOP LIGHT position. Depress brake pedal. Check voltage from socket B in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 13. Test 2. Place light selector switch in SER DRIVE position. Depress brake pedal. Check voltage from socket B in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 13. Test 3. Place light selector switch in SER DRIVE position. Check voltage from socket E in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 9. Test 4. Place light selector switch in V.O. MARKER position. Depress brake pedal. Check voltage from socket F in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 11. Test 5. Place light selector switch in B.O. MARKER position. Check voltage from sockets C and A in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 15. Test 6. Place light selector switch in B.O. DRIVE position. Depress brake pedal. Check voltage from socket F in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 11. Test 7. Place light selector switch in B.O. DRIVE position. Check voltage from sockets A and C in trailer receptacle to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 15. Test 8. Check resistance from sockets D and L in trailer receptacle to carrier ground. Reading should be 0 ohms. If reading is infinity, receptacle or wiring harness is defective; notify direct support maintenance personnel. Test 9. Disconnect plug C-9 at light selector switch and circuit 21 lead at trailer wiring harness. Check resistance from socket H in plug C-9 through disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.

Table 2-11. Carrier Hull and Miscellaneous Electrical System Troubleshooting—Continued

Carrier hull and miscellaneous electrical system malfunction	Tests
3. Continued	Test 10. Disconnect circuit 21 lead at main wiring harness junction. Check resistance from socket E in trailer receptacle to disconnected end of circuit 21 lead. Reading should be 0 ohms. If any other reading is obtained, wiring harness or trailer receptacle is defective; notify direct support maintenance personnel. Test 11. Disconnect plug C-9 at light selector switch and circuit 23 lead at trailer wiring harness. Check resistance from socket N in plug C-9 through disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 12. Disconnect circuit 23 lead at main wiring harness junction. Check resistance from socket F in trailer receptacle to disconnected end of circuit 23 lead. Reading should be 0 ohms. If any other reading is obtained, wiring harness or trailer receptacle is defective; notify direct support maintenance personnel. Test 13. Disconnect plug C-9 at light selector switch and circuit 22 lead at trailer wiring harness. Check resistance from socket C in plug C-9 through disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 14. Disconnect circuit 22 lead at main wiring harness junction. Check resistance from socket B in trailer receptacle to disconnected end of circuit 22 lead. Reading should be 0 ohms. If any other reading is obtained, wiring harness or trailer receptacle is defective; notify direct support maintenance personnel. Test 15. Disconnect plug C-9 at light selector switch and circuit 24 lead at trailer wiring harness. Check resistance from socket E in plug C-9 through disconnected lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 16. Disconnect circuit 24 lead at main wiring harness junction. Check resistance from sockets C and A in trailer receptacle to disconnected end of circuit 24 lead. Reading should be 0 ohms. If any other reading is obtained, wiring harness or trailer receptacle is defective; notify direct support maintenance personnel.
4. Radio receptacle inoperative	Test 1. Place master switch in ON position. Check voltage from hot-lead socket to carrier ground. Reading should be 20 to 28 volts. If reading is 0 volts, proceed to test 2. Test 2. Place master switch in OFF position. Unsolder capacitor lead from circuit 48 lead. Place master switch in ON position. Check voltage from hot-lead socket to carrier ground. Reading should be 20 to 28 volts. If reading is correct, replace defective capacitor (para 2-144). If reading is 0 volts, proceed to test 3. Test 3. Disconnect circuit 48 lead at bus bar and at radio receptacle. Check lead resistance. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
5. Windshield wiper motor inoperative	Test 1. Disconnect circuit 71 lead at wiper motor. Place master switch and wiper switch in ON position. Check voltage from circuit 71 lead to ground. Reading should be 20 to 28 volts. Verify that the wiper linkage is not binding. If reading is 20 to 28 volts, replace defective wiper motor (para 2-253). If reading is 0 volts-proceed to test 2. Test 2. Disconnect circuit 71 and 71A leads at windshield wiper switch. Place switch in ON position. Reading should be 0 ohms. Place switch in OFF position. Reading should be infinity. If any other readings are obtained, replace defective switch (para 2-254).

Table 2-11. Carrier Hull and Miscellaneous Electrical System Troubleshooting — Continued

Carrier hull and miscellaneous electrical system malfunction	Tests
5. Continued	Test 3. Disconnect circuit 71 lead at wiper motor and wiper switch. Check lead resistance. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 4. Disconnect circuit 71A lead at wiper switch and circuit 27 lead at instrument panel circuit breaker. Check resistance of disconnected leads. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.

Section VII. POWER PLANT

2-28. General

a. Scope. This section contains instructions for removal, inspection, and installation of the power plant. A reference listing for maintenance operations performed on the power plant is also included.

b. Description. The power plant (fig. 2-14.1) consists of three major components: engine, trans-

mission, and transfer gearcase. Minor components are: generator, starter, governor, air box heater, engine oil filter, engine oil cooler, differential oil filter, transmission-differential oil cooler, and engine coolant pump.

c. Torque Wrench Specifications. Refer to table 2-12 for torque tightness readings for the more critical points of the power plant.

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Figure 2-13. Power plant — left front view.

DELETED

Figure 2-14. Power plant — right rear view.

2-29. Traverse Beam with Center Seat Section

(fig. 2-15).

*a. Removal.***NOTE**

Unless replacement beam is being installed, do not remove shims cemented to transverse beam and driver's seat support.

Table 2-12. Power Plant Torque Wrench Specifications

Fig. No.	Location	Pound-feet torque
2-15	Transverse beam-to-left hull screws.	90
2-15	Top transverse beam to seat plenum screws.	30
2-17	Engine mount-to-hull cap screw.	120-130
2-98	Transfer gearcase-to-hull left mount cap screw.	75-80
2-110	Universal joint-to-yoke cap screw (6C U-joint)	35-40
2-109	Propeller shaft-to-universal joint cap screw (7C U-joint)	86-94
2-187	Power takeoff-to-winch transfer gearcase propeller shaft nut.	14-17

(1) Remove cab cover and frame (TM 9-1450-585-10).

(2) Fold rear compartment cover back, or remove rear compartment cover and bows (para 2-251).

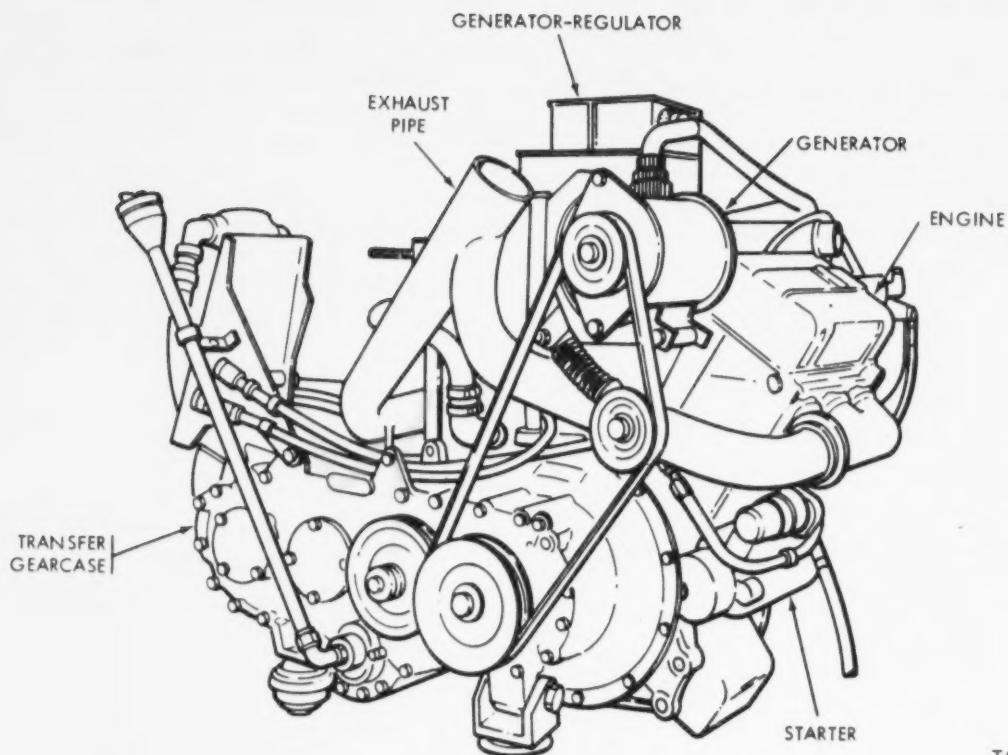
(3) Remove power plant intake and exhaust grilles (para 2-221).

(4) Remove blast cover and blast cover support channel (para 2-239).

(5) Disconnect air cleaner flexible hose, and remove case and element (para 2-72).

NOTE

On carrier after C-308, disconnect air cleaner indicator hose at engine air inlet (para 2-75).



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Figure 2-14.1. Power plant — right rear view.

(6) Remove two clamps securing thermostat vent hose and engine vent hose to transverse beam (para 2-86).

(7) Place center personnel seat in raised position, and secure to transverse beam (A).

(8) Remove two screws, washers, and nuts securing primary fuel filter to transverse beam, and remove filter from beam (C).

(9) Remove four screws and washers securing two blast cover support beams at rear power plant compartment bulkhead (A).

(10) Remove three screws, nuts, and six washers securing transverse beam to driver's seat support (B).

(11) Remove two screws and washers securing top of transverse beam to right seat plenum (D).

(12) Remove one screw, nut, and two washers securing bottom of transverse beam to right seat plenum (E).

(13) Remove two screws and washers securing transverse beam to left side of hull (F).

(14) Lift transverse beam, two blast support beams, and center seat section as a unit from carrier.

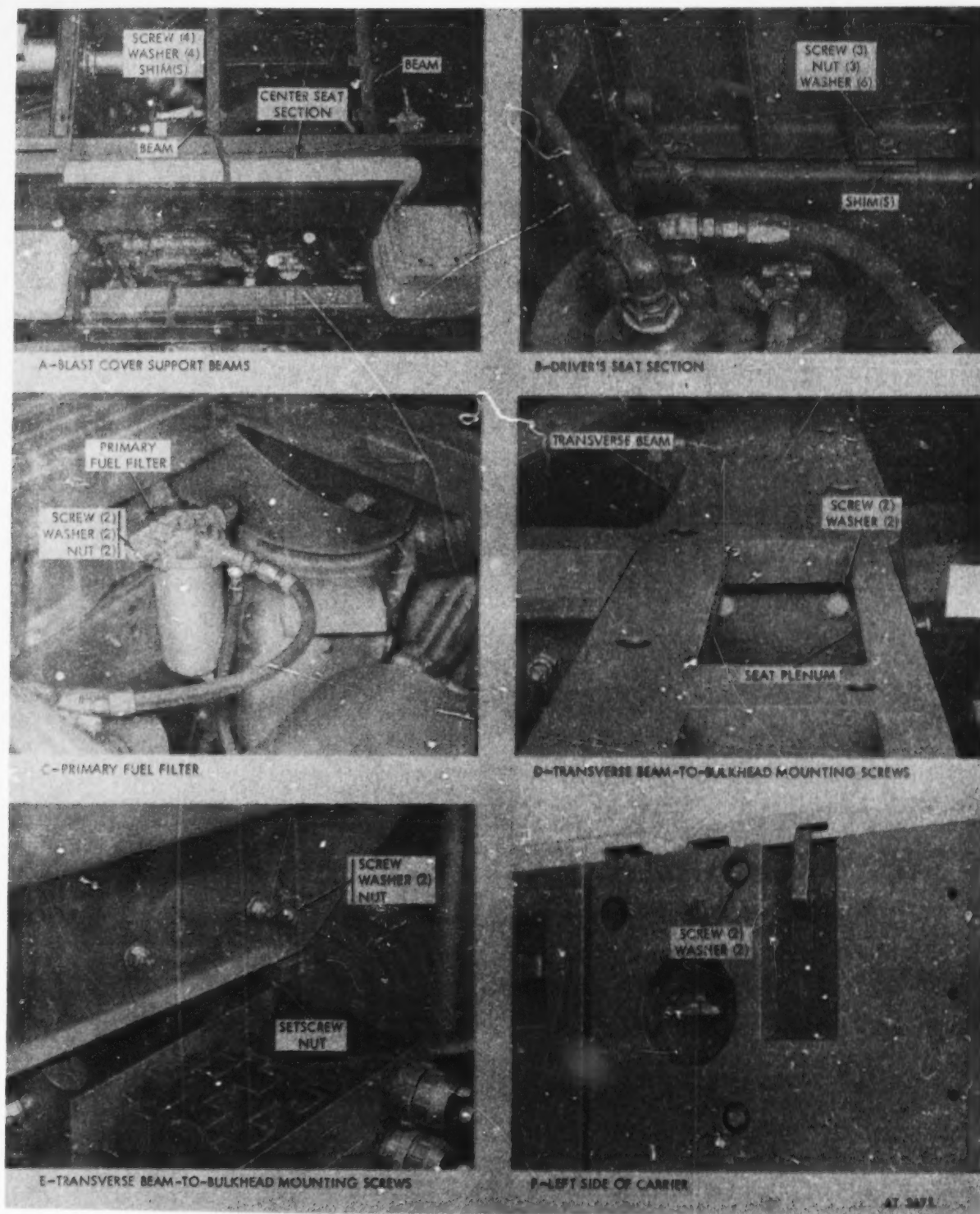


Figure 2-15. Transverse beam with center seat section.

b. Inspection and Repair. Inspect transverse beam and blast cover support beams for cracks, distortion, and missing shims. Repair minor cracks and distortions. Replace missing shims (*c* below). Replace beams damaged beyond repair.

c. Installation.

(1) Shimming procedure.

(a) Position transverse beam, two blast cover support beams, and center seat section as a unit in carrier as far left as possible.

(b) Adjust setscrew (E) until right top edge of transverse beam is parallel with top edge of right seat plenum, and secure setscrew with nut.

(c) Add shim(s) between transverse beam and driver's seat support until top left edge of beam is parallel with top of hull.

(d) Add shim(s) at screw mounting hole where gap exists between transverse beam and left hull.

(e) Add shim(s) between transverse beam and right seat plenum until no gap appears.

(f) Remove transverse beam from carrier.

(g) Clean mating surfaces of beam, driver's seat support, and shims, and apply a light coat of adhesive MIL-A-5092 (8040-00-290-4301) to mating surfaces.

(h) Install shim(s) on left and right sides of transverse beam, and install bottom shim(s) on driver's seat support (B).

(2) Position shimmed transverse beam ((1) above) in carrier.

(3) Secure transverse beam and shim(s) at left side of hull with two screws and washers (F). Tighten screws to 90 pound-feet torque.

(4) Secure bottom right side of transverse beam and shim(s) to right seat plenum with one screw, nut, and two washers (E).

(5) Secure top right side of transverse beam and shim(s) to right seat plenum with two screws and washers (D). Tighten screws to 30 pound-feet torque.

(6) Secure transverse beam and shim(s) to driver's seat support with three screws, nuts, and six washers (B).

(7) Secure two blast cover support beams to rear power plant compartment bulkhead with four screws and washers (A).

NOTE

If beam(s) is being replaced, add shim(s) as required until beam(s) bears at both ends, and tack weld shim(s) together and to end plate(s) of beam(s) on all four sides.

(8) Position primary fuel filter on transverse beam, and secure with two screws, nuts, and washers (C).

(9) Place center personnel seat in operating position.

(10) Secure thermostat vent hose and engine vent hose to transverse beam with two clamps (para 2-86).

(11) Connect flexible hose and install air cleaner case and element (para 2-72).

NOTE

On carriers after C-308, connect air cleaner indicator hose at engine air inlet (para 2-75).

(12) Install blast cover support channel and blast cover (para 2-239).

(13) Install power plant intake and exhaust grilles (para 2-221).

(14) Install rear compartment bows and cover (para 2-251), or secure rear compartment cover.

(15) Install cab cover and frame (TM 9-1450-585-10).

2-30. Power Plant

(fig. 2-16)

a. Removal.

(1) Remove cab cover and frame (TM 1450-585-10).

(2) Fold rear compartment cover back, or remove rear compartment cover and bows (para 2-251).

(3) Remove power plant intake and exhaust grilles (para 2-221).

(4) Remove blast cover and blast cover support channel (para 2-239).

(5) Disconnect air cleaner flexible hose (A), and remove case and element (para 2-72).

NOTE

On carriers after C-308, disconnect air cleaner indicator hose at engine air inlet (para 2-75).

(6) Remove two clamps securing thermostats vent hose and engine vent hose to transverse beam (para 2-86).

(7) Remove transverse beam and center seat section (para 2-29).

(8) Drain engine cooling system (para 2-80).

(9) Disconnect regulator wiring harness and power plant wiring harness connectors (B) at battery box bulkhead.

(10) Disconnect circuit 7 lead (C) at battery negative post.

NOTE

The transfer gearcase uses a wet sump and has no scavenger pump. One tube assembly is installed on the transfer gearcase to drain it.

(11) Disconnect differential-to-oil pump hose coupling (D) at pump on transfer gearcase.

(12) Disconnect differential oil temperature circuit 328 lead connector (E) at differential lead.

(13) Disconnect differential oil inlet hose coupling (E) at differential.

(14) Deleted.

(15) Disconnect accelerator pedal link (B) at cross shaft lever (para 2-211).

(16) Disconnect range selector link (B) at cross shaft lever (para 2-213).

(17) Disconnect fuel cutoff cable (F) at governor, and remove cable from power plant (para 2-212).

(18) Disconnect winch propeller shaft (G) at winch power takeoff (para 2-246).

(19) If carrier is equipped with engine coolant heater kit, disconnect heater-to-engine hose at heater and engine-to-coolant pump hose at oil cooler valve (para 3-37).

(20) Remove transmission-to-differential propeller shaft (para 2-174).

(21) Disconnect thermostat vent hose and two coolant hoses securing coolant inlet tube (H and fig. 1-5) to oil cooler inlet elbow and radiator outlet tube. Remove coolant inlet tube (para 2-86).

(23) Remove four coolant tube hose clamps and two coolant tube hoses securing coolant outlet tube (H and fig. 1-5) to thermostat outlet elbow and radiator inlet coolant tube. Remove coolant outlet tube (para 2-86).

(24) Remove one screw and washer securing hull-to-starter ground lead (I) to hull, and disconnect ground lead from hull.

(25) Remove rear fan drive-belts from jackshaft pulley (J).

(26) Disconnect clamp securing exhaust pipe to muffler (K), and remove exhaust pipe from left crossover pipe (para 2-76).

(26.1) M730A1; remove the exhaust muffler (para 2-78).

(27) Disconnect tachometer flexible shaft at engine tachometer drive adapter (L).

(28) Disconnect engine fuel supply hose and fuel return hose at quick disconnect couplings (M).

(29) Attach power plant lifting sling to power plant (O), and take up slack with lifting hoist.

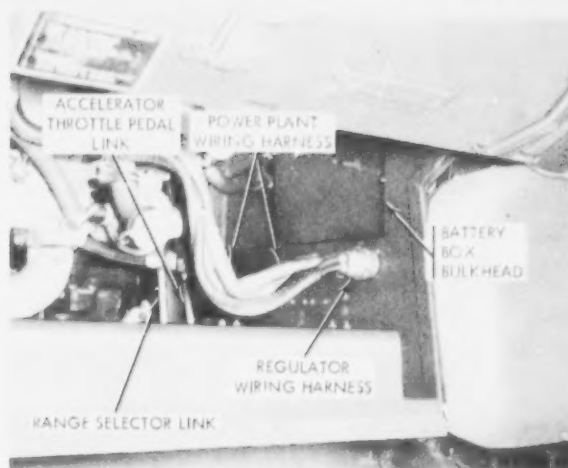
(30) Remove two screws and washers securing front engine mount to hull (N).

(31) Remove two clamps securing right transfer gearcase mount (J) and left transfer gearcase mount (P) to hull brackets.

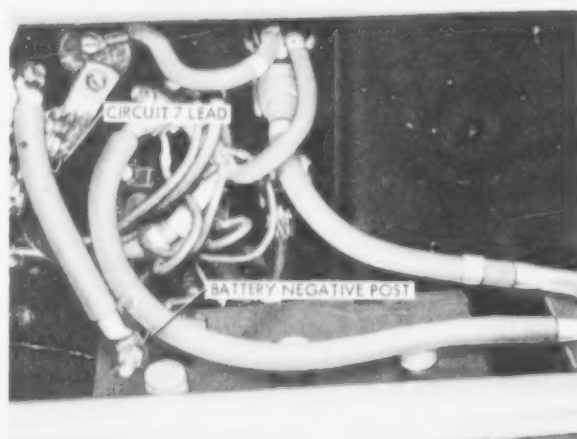
(32) Carefully remove power plant from carrier with hoist.



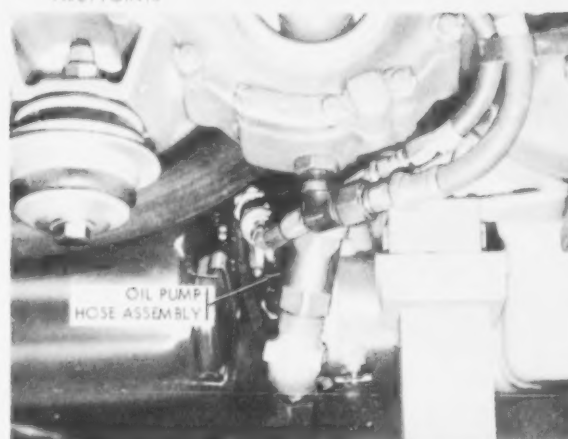
A-AIR CLEANER AND HOSE DISCONNECT POINTS



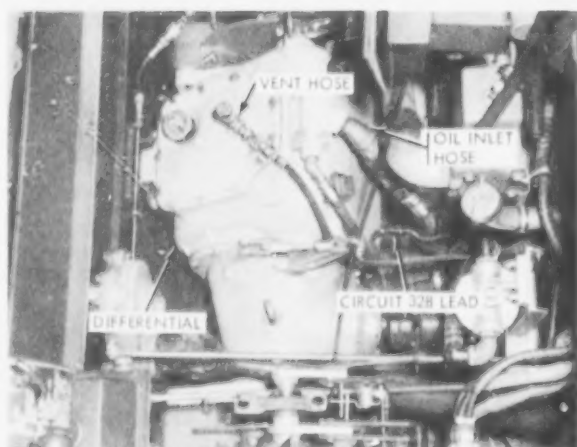
B-POWER PLANT WIRING HARNESS AND LINKAGE DISCONNECT POINTS



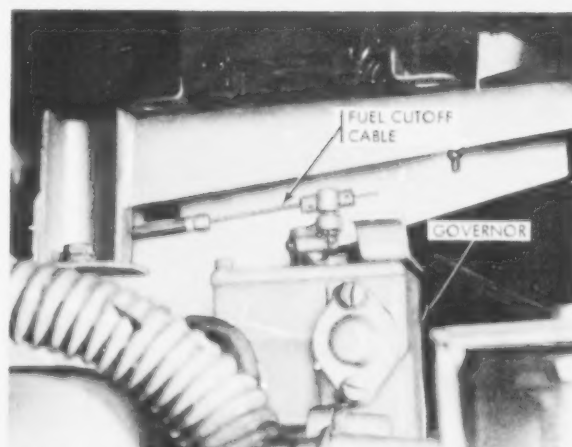
C-CIRCUIT 7 LEAD



D-DIFFERENTIAL HOSE ASSEMBLY DISCONNECT POINT



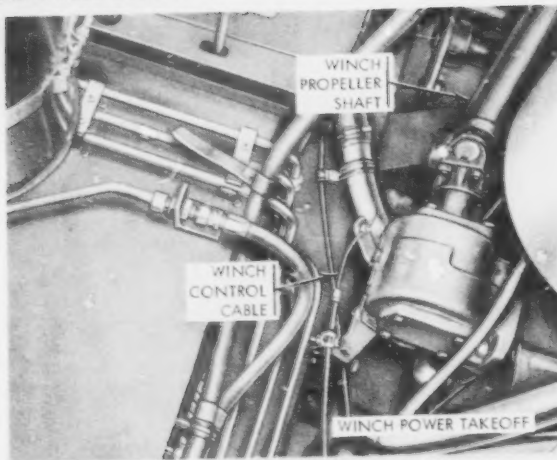
E-CIRCUIT 32B LEAD, DIFFERENTIAL OIL INLET HOSE, AND VENT (EARLY MODEL)



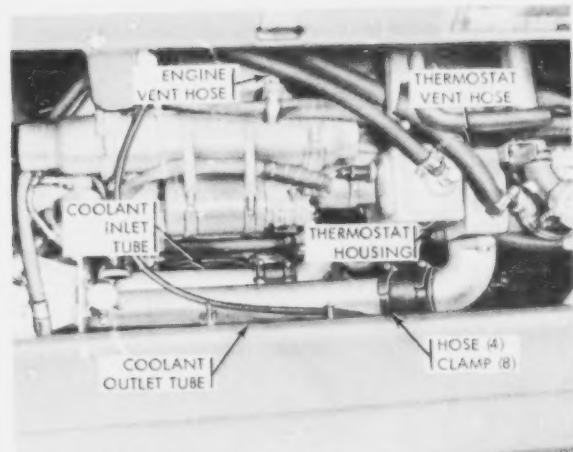
F-FUEL CUTOFF CABLE DISCONNECT POINTS

TA 04413

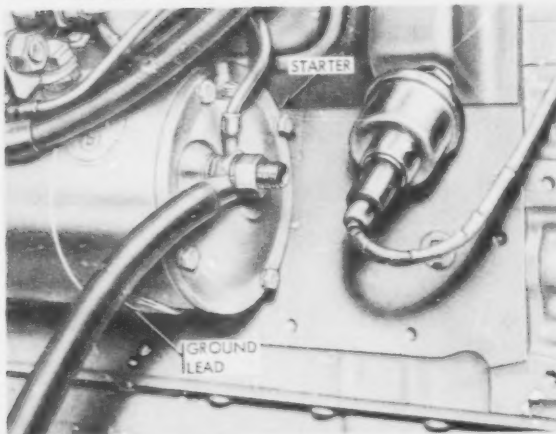
Figure 2-16. Power plant disconnect and connect points (sheet 1 of 3).



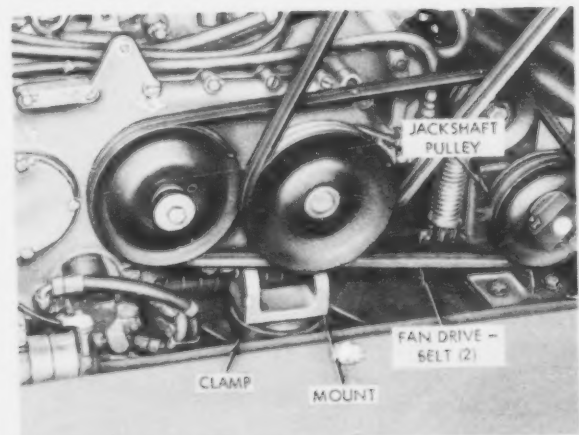
G-POWER TAKEOFF PROPELLER SHAFT AND CABLE DISCONNECT POINTS



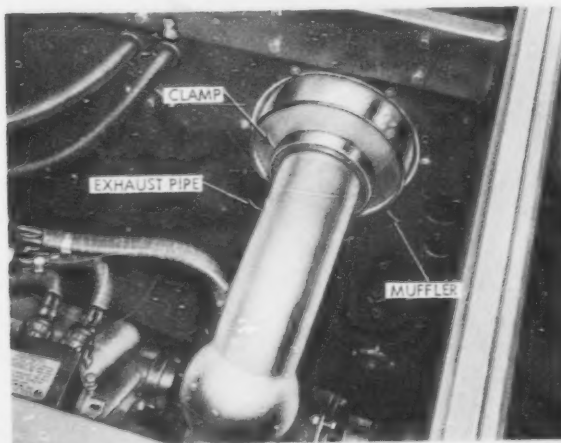
H-POWER PLANT COOLANT HOSE DISCONNECT POINTS



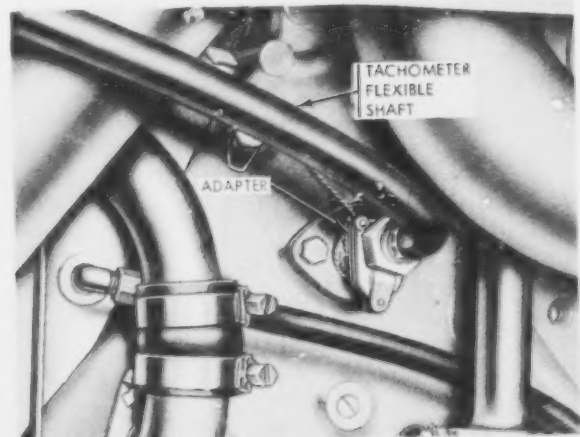
I-STARTER GROUND LEAD



J-POWER PLANT RIGHT REAR MOUNT



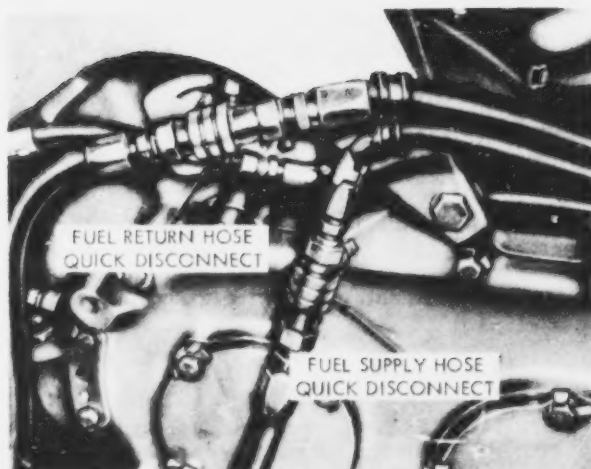
K-EXHAUST PIPE



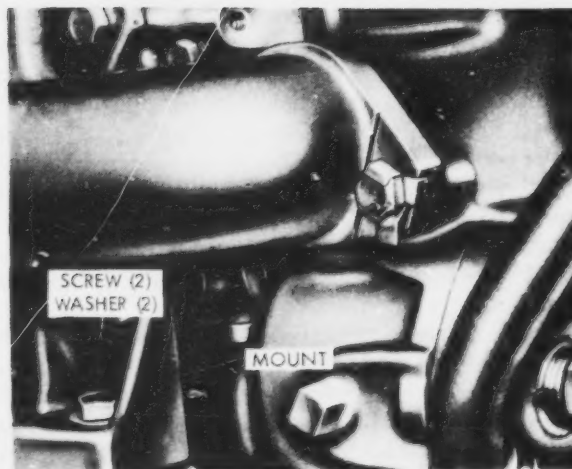
L-TACHOMETER CABLE DISCONNECT POINT

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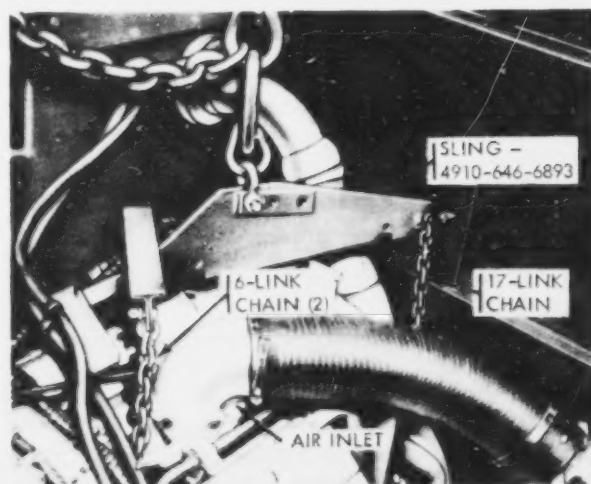
Figure 2-16. Power plant disconnect and connect points (sheet 2 of 3)



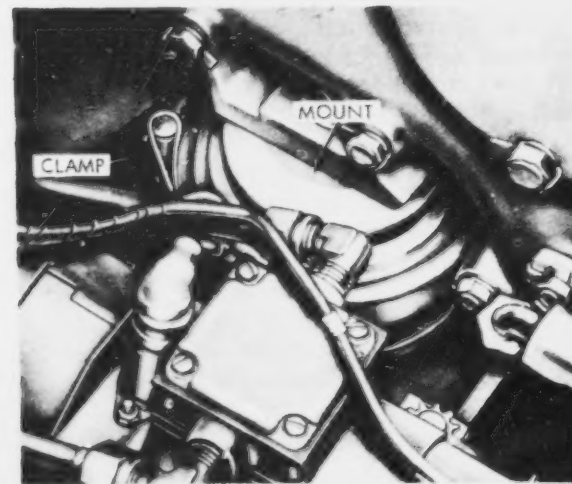
M-FUEL SUPPLY AND RETURN LINES DISCONNECT POINTS



N-ENGINE MOUNT



O-POWER PLANT WITH LIFTING SLING



P-POWER PLANT LEFT REAR MOUNT

AT 26200

Figure 2-16. Power plant disconnect and connect points (sheet 3 of 3).

b. Inspection Before Installation.

- (1) Check electrical connections for tightness and security of mounting.
- (2) Inspect all oil, fuel, and coolant hoses, tubes, and fittings for damage and security of mounting.
- (3) Examine power plant compartment to make certain it is clean and ready to receive power plant.

c. Installation.

- (1) Attach power plant lifting sling to power plant (O), and carefully position power plant in power plant compartment.
- (2) Secure transfer gearcase mount (P) and right transfer gearcase mount (J) to hull brackets with two clamps, making certain clamp nuts are inboard and forward (P).

- (3) Secure front engine mount to hull with two screws and washers (N). Tighten screws to 120 to 130 pound-feet torque.

- (4) Remove power plant lifting sling.
- (5) Connect engine fuel supply hose and fuel return hose at quick disconnect couplings (M).
- (6) Connect tachometer flexible shaft at engine tachometer drive adapter (L).

- (7) Position exhaust pipe to left crossover pipe and muffler (para 2-76), and secure pipe at muffler with clamp (K). Tighten clamp nut to 16 to 18 pound-feet torque.

- (7.1) M730A1, install exhaust muffler (para 2-78).

- (8) Install rear fan drive-belts on jackshaft pulley (J), and adjust drive-belts (para 2-85a).

- (9) Position hull-to-starter ground lead (I) or hull, and secure with one screw and washer.

(10) Position outlet coolant tube (H and fig. 1-5) to thermostat outlet elbow and to radiator inlet coolant tube, and secure with two coolant tube hoses and four coolant tube hose clamps (para 2-86).

(11) Position inlet coolant tube (H) to oil cooler inlet and to radiator outlet tube, and secure with two coolant tube hoses and four coolant tube hose clamps (para 2-86).

(12) Connect thermostat vent hose and engine vent hose (H and fig. 1-5) at thermostat housing (para 2-86).

(13) Install transmission-to-differential propeller shaft (para 2-174).

(14) If carrier is equipped with engine coolant heater kit, connect engine-to-coolant pump hose at oil cooler valve and heater-to-engine hose at heater (para 3-37).

(15) Connect winch power takeoff control cable (G) at winch power takeoff (para 2-247).

(16) Connect winch propeller shaft (G) at winch power takeoff (para 2-246).

(17) Connect fuel cutoff cable (F) at governor, and adjust cable (para 2-212).

(18) Connect range selector link (B) at cross shaft lever, and adjust linkage (para 2-213).

(19) Connect accelerator pedal link (B) at cross shaft lever, and adjust linkage (para 2-211).

NOTE

The transfer gearcase uses a wet sump for lubrication and has no pump or supply hoses. A rigid tube is used on the gearcase to drain it from the bottom of the gearcase.

(20) Deleted.

(21) Connect differential oil inlet hose (E) at differential.

CAUTION

Be sure differential oil output hose quick disconnect coupling is properly connected and secured. Improper connection will result in failure of the differential.

(22) Connect differential oil temperature circuit 328 lead connector (E) at differential lead.

(23) Connect differential-to-oil pump hose coupling (D) at pump on transfer gearcase.

(24) Connect circuit 7 lead (C) at battery negative post.

(25) Connect power plant wiring harness and regulator wiring harness connectors (B) at battery box bulkhead.

(26) Fill cooling system (para 2-80).

(27) Install transverse beam and center seat section (para 2-29).

(28) Secure thermostat vent hose and engine vent hose to transverse beam with two clamps (para 2-86).

(29) Connect air cleaner flexible hose (A), and install case and element (para 2-72).

NOTE

On carriers after C-308, connect air cleaner indicator hose at engine air inlet (para 2-75).

(30) Install blast cover support channel and blast cover (para 2-239).

(31) Install power plant intake and exhaust grilles (para 2-221).

(32) Install rear compartment bows and cover (para 2-251), or secure rear compartment cover.

(33) Install cab cover and frame (TM 9-1450-

2-31. Operations Performed in Power Plant Compartment

a. Scope. This paragraph lists the various maintenance services performed with the power plant installed in the carrier. Subparagraphs *b* through *h* below indicate which access panels and/or covers must be raised or removed to perform the services. Subparagraph *i* below lists services performed after the power plant has been removed from the carrier.

b. Cab Floor Plates Raised.

(1) Remove and install winch transfer gearcase (para 2-245).

(2) Remove and install differential oil breather (para 2-168).

(3) Disassemble and assemble differential-to-left final drive plate (para 2-173).

(4) Dissassembly and assemble differential-to-right final drive propeller shaft (para 2-172).

(5) Disassemble, assemble, and adjust differential steering brake controls and linkage (para 2-203).

(6) Remove and install pivot steering brake assemblies (para 2-207).

c. Center Seat Section Raised.

(1) Remove and install differential oil high temperature switch (para 2-134).

(2) Remove and install transmission oil high temperature switch (para 2-135).

(3) Adjust coolant pump drive-belts (para 2-81).

(4) Remove and install coolant pump drive-belts (para 2-81).

(5) Remove and install coolant pump drive-belts idler pulley (para 2-82).

(6) Remove and install coolant pump (para 2-83).

(7) Remove and install thermostat (para 2-84).

(8) Remove and install engine oil low pressure switch (para 2-132).

(9) Remove and install engine coolant temperature transmitter (para 2-133).

(10) Remove and install engine oil level gage rod (para 2-41).

(11) Remove and install engine oil filler cap (para 2-40).

(12) Remove and install engine fuel filter (para 2-56 and 2-57).

(13) Remove and install engine fuel filter elements (para 2-58).

(14) Remove and install cooling fan drive-belts (para 2-85).

(15) Remove and install cooling fan drive-belt idler pulley (para 2-89).

(16) Remove and install cooling fan drive-belt idler adjusting linkage (para 2-90).

(17) Disassemble and assemble cooling fan drive-belt idler adjusting linkage (para 2-90).

(18) Remove and install differential oil filter element (para 2-66).

(19) Remove and install differential oil filter (para 2-163).

(20) Remove and install cooling fan assembly (para 2-88).

(21) Remove and install air box heater accumulator (para 2-63).

(22) Remove and install air box heater harness and cable (para 2-67, early models; para 2-67.1, late models).

(23) Remove and install air box heater ignition coil (para 2-64, early models; para 2-64.1, late models).

(24) Remove and install air box heater accumulator pressure gage (para 2-65, early models).

(25) Remove and install air box heater hand pump (para 2-66, early models).

(26) Remove and install air box heater hoses and fittings (para 2-68, early models; para 2-68.1, late models).

(27) Remove and install air box heater ignitor and nozzle (para 2-70, early models; para 2-70.1, late models).

(28) Remove and install air box heater solenoid valve (para 2-69, early models; para 2-69.1, late models).

(29) Remove and install air cleaner element (para 2-73).

d. Cab Floor Plates and Personnel Seat Supports Raised.

(1) Disassemble and assemble transmission-to-differential universal joint (para 2-174).

(2) Disassemble, assemble and adjust transmission range selector controls and linkage (para 2-213).

(3) Remove and install differential oil cooler hoses and fittings (para 2-165).

(4) Remove and install differential oil cooler hoses and fittings (para 2-246).

c. Power Plant Access Panels Removed.

(1) Remove and install air cleaner hose (para 2-74).

(2) Remove and install air cleaner case (para 2-72).

(3) Remove and install exhaust pipe (para 2-76).

(4) Remove and install exhaust muffler (para 2-78).

(5) Remove and install generator-regulator (para 2-108).

(6) Remove and install generator (para 2-103).

(7) Remove and install rectifier (para 2-107).

(8) Remove and install transmission oil hoses and fittings (para 2-153).

(9) Remove and install air box drain tubes (para 2-37).

(10) Remove and install engine oil filter (para 2-34).

(11) Remove and install engine fuel pump (para 2-45).

(12) Disassemble and assemble engine quick disconnect linkage (para 2-214).

(13) Remove and install radiator (para 2-87).

(14) Remove and install engine oil filter element (para 2-35).

f. Circular Access Panels Removed.

(1) Remove and install engine oil filter (para 2-34).

(2) Remove and install engine oil filter element (para 2-35).

(3) Adjust generator drive-belts (para 2-106).

(4) Remove and install generator drive-belts (para 2-106).

g. Power Plant Access Panels Removed and Center Seat Section Raised.

(1) Remove and install engine fuel filter hoses (para 2-54 and 2-55).

(2) Remove and install coolant tubes (para 2-86).

(3) Remove and install exhaust manifolds (para 2-43).

h. Power Plant Bottom Access Covers Removed.

(1) Remove and install air box collector can and element (para 2-38).

(2) Drain cooling system (para 2-80).

(3) Remove and install transmission oil filter element (para 2-155).

(4) Remove and install differential oil pump relief valve (para 2-170).

(5) Drain oil from engine, transmission, differential, and transfer gearcase (LO 9-1450-585-12).

i. Power Plant Removed from Carrier.

(1) Remove and install engine (para 2-30).

(2) Remove and install engine mount (para 2-33).

(3) Remove and install engine oil cooler core

(para 2-42).

(4) Remove and install transmission oil cooler core (para 2-154).

(5) Remove and install transfer gearcase mounts (para 2-158).

(6) Remove and install differential oil cooler core (para 2-164).

Section VIII. ENGINE

2-32. General

a. Scope. This section contains maintenance instructions for the engine and accessories. Engine maintenance performed with the power plant installed in the carrier consists of removal, cleaning, inspection and repair (as required), and installation of air box drain tubes and collector can, crankcase breather hose, oil filler cap and tube, coolant pump, fuel pump, oil filter and element, exhaust manifolds, and connecting hoses and tubes. Engine maintenance performed with the power plant removed consists of removal, cleaning, inspection and repair (as required), and installation of engine oil cooler and core, and engine mount.

b. Description.

(1) Power is supplied by a liquid-cooled, 6-cylinder, V-type, compression-ignition (diesel) engine operating on the two-stroke cycle principle. In the two-stroke cycle, intake and exhaust take place during the compression and power strokes. A blower forces air into the cylinders through a row of ports to scavenge the exhaust gases and supply the cylinders with fresh air for combustion. The ports are above the piston when the piston is at the bottom of the cylinder on the down stroke, and the single direction of air flow through the ports produces the scavenging effect that leaves the cylinders full of clean air when the piston comes up and covers the ports. As the piston continues on the up stroke, a charge of fuel is injected into the cylinder by a unit of the fuel injector. The heat of compression ignites the fuel and the resulting pressure forces the piston down on its power stroke. The exhaust valves again open when the piston is about halfway down, allowing the burnt gases to escape into the exhaust manifold. The ports are uncovered and the cylinder is again swept clean with scavenging air. The entire combustion cycle is completed in each cylinder for each revolution of the crank-shaft, or in two strokes — the two-stroke cycle.

(2) The unit fuel injectors supply the high pressure required for fuel injection and meter, inject, atomize, and bypass the excess fuel. This bypassing of the excess fuel helps to cool the fuel injectors. A positive displacement gear-type fuel pump attaches to the fly-wheel housing and is gear-driven off the cam gear. A spring-loaded pressure regulator in the pump body opens when pressure on the outlet side becomes excessive because of a plugged filter or fuel line.

(3) Lubricating oil is drawn from the crankcase by an oil pump mounted in the lower front cover. Oil is forced through passages in the block to the oil filter adapter on the side of the engine, flows to the oil filter, and through the engine oil cooler core and back through the block to the oil gallery. The oil system is designed to supply an adequate oil flow when the carrier is operating up or down grades from 0 to 60 percent, or when the carrier is operating on side slopes up to 30 degrees.

(4) The engine is cooled by coolant circulating through the oil cooler housing and engine block to the engine radiator. Harmful vapors which may form within the engine are removed from the crankcase and injector compartment by a continuous ventilation system. A slight pressure is maintained within the engine crankcase and injector compartment by the seepage of a small amount of air past the piston rings. During normal engine operation, water vapor from the air charge, as well as a slight amount of fuel and lubricating oil fumes, condense and settle on the bottom of the air box. The condensation is removed by air box pressure through drain tubes located on each side of the cylinder block. The drain tubes should be open at all times.

(5) Variable engine speed is regulated by a double-weight governor. Starting is by a heavy duty electrical cranking motor.

c. Torque Wrench Specifications. Refer to table 2-13 for torque tightness readings for the more critical points of the engine and components.

Table 2-13. Engine Torque Wrench Specifications

Fig. No.	Location	Pound-feet torque
2-17	Engine mount cap-to-base cap screw.	30-35
2-26	Exhaust manifold stud nut.	30-35
2-28	Fuel pump-to-engine cap screw.	13-17
2-26	Exhaust manifold-to-cross-over pipe clamp nut.	16-18

2-33. Engine Mount

(fig. 2-17)

a. Removal.

- (1) Remove power plant (para 2-30).
- (2) Separate engine mount cap from base by removing two cap screws and washers.
- (3) Remove rubber cushion ring from engine support.

b. Inspection and Repair.

- (1) Inspect rubber cushion ring for cracks, wear, and loss of resiliency. Replace ring that shows any of these defects.
- (2) Inspect mount cap and base for cracks and deformation. Replace cap or base that shows either of these defects.

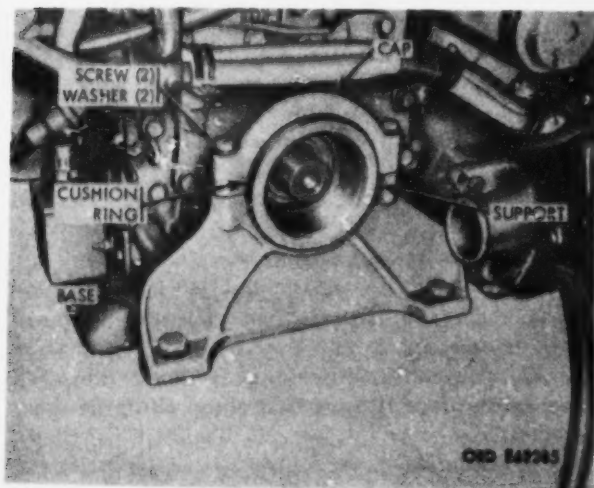


Figure 2-17. Engine mount.

c. Installation.

- (1) Install rubber cushion ring on engine support.
- (2) Position engine mount base and cap on installed cushion ring, apply antiseize compound MIL-A-907 to threaded holes, and secure with two washers and cap screws. Tighten cap screws to 30 to 35 pound-feet torque.
- (3) Install power plant (para 2-30). Tighten engine mount-to-hull cap screws to 120-130 pound-feet torque.

2-34. Engine Oil Filter

(fig. 2-18)

a. Removal.

- (1) Place clean container of at least 1 quart capacity under oil filter.
- (2) Remove drain plug, and allow oil to drain from filter.
- (3) Disconnect oil hoses from filter elbow.
- (4) Remove four nuts, washers, and screws, and remove filter from bracket.

NOTE

If oil filter is to be replaced, remove elbows from filter cover and install on replacement filter.

b. Inspection and Repair.

- (1) Inspect oil filter inlet and outlet openings for damaged threads. Replace oil filter that shows thread damage.
- (2) Inspect filter case and cover for dents that may cause oil filter to leak between case and cover. Replace oil filter if this condition exists.

c. Installation.

- (1) Position oil filter on bracket, and secure with four screws, washers, and nuts.
- (2) Connect oil hoses to filter elbows.
- (3) Install drain plug in filter case.
- (4) Add oil as prescribed in LO 9-1450-585-12.
- (5) Start engine, and check for oil leakage. If leakage is evident, follow *b* (2) above, or check security of case on cover.

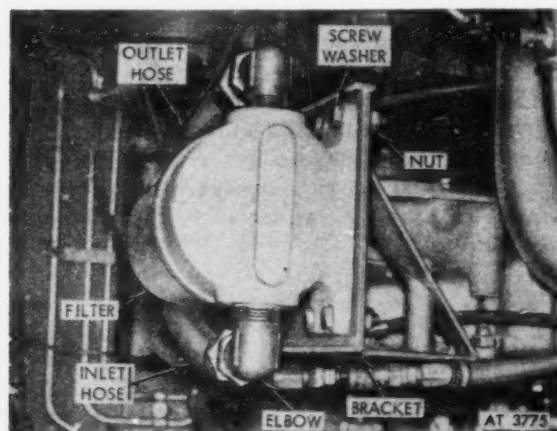


Figure 2-18. Engine oil filter.

2-35. Engine Oil Filter Element
(fig. 2-19)

a. Removal.

- (1) Place clean container of at least 1 quart capacity under oil filter.
- (2) Remove drain plug, and allow oil to drain from filter.
- (3) Loosen anchor screw at bottom of oil filter case, and separate case from cover.
- (4) Remove and discard filter element and gasket.

b. Cleaning, Inspection, and Repair.

- (1) Inspect case and cover for dents that may cause filter to leak between case and cover. Replace defective case and cover.

- (2) Wipe inside of case using clean cloth.

c. Installation.

- (1) Install new filter element and gasket in case.
- (2) Position case to cover, and secure with anchor screw.
- (3) Install drain plug.
- (4) Add oil as prescribed in LO 9-1450-585-12.
- (5) Start engine, and check for oil leakage.

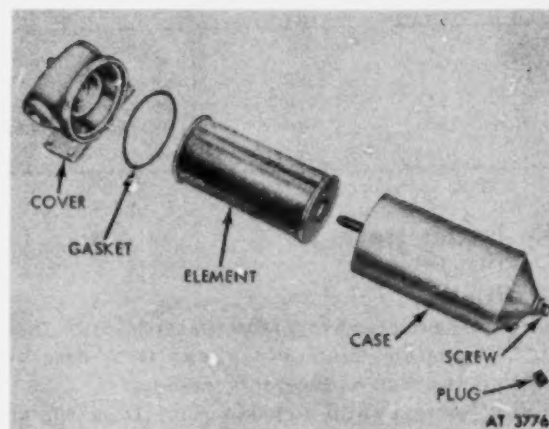


Figure 2-19. Engine oil filter element.

2-36. Engine Oil Filter Hoses and Fittings
(fig. 2-20)

a. Removal.

- (1) Remove screw (6) and nut (12), and remove clamp (5) securing engine oil filter hoses (7 and 8) to power plant.
- (2) Remove screw (4) and nut (11), and remove two clamps (10) securing hoses together.
- (3) Disconnect hoses at engine, and hold down to allow oil to drain.
- (4) Remove two elbows (1) from engine block.
- (5) Disconnect hoses at oil filter (9), and remove two elbows (2).

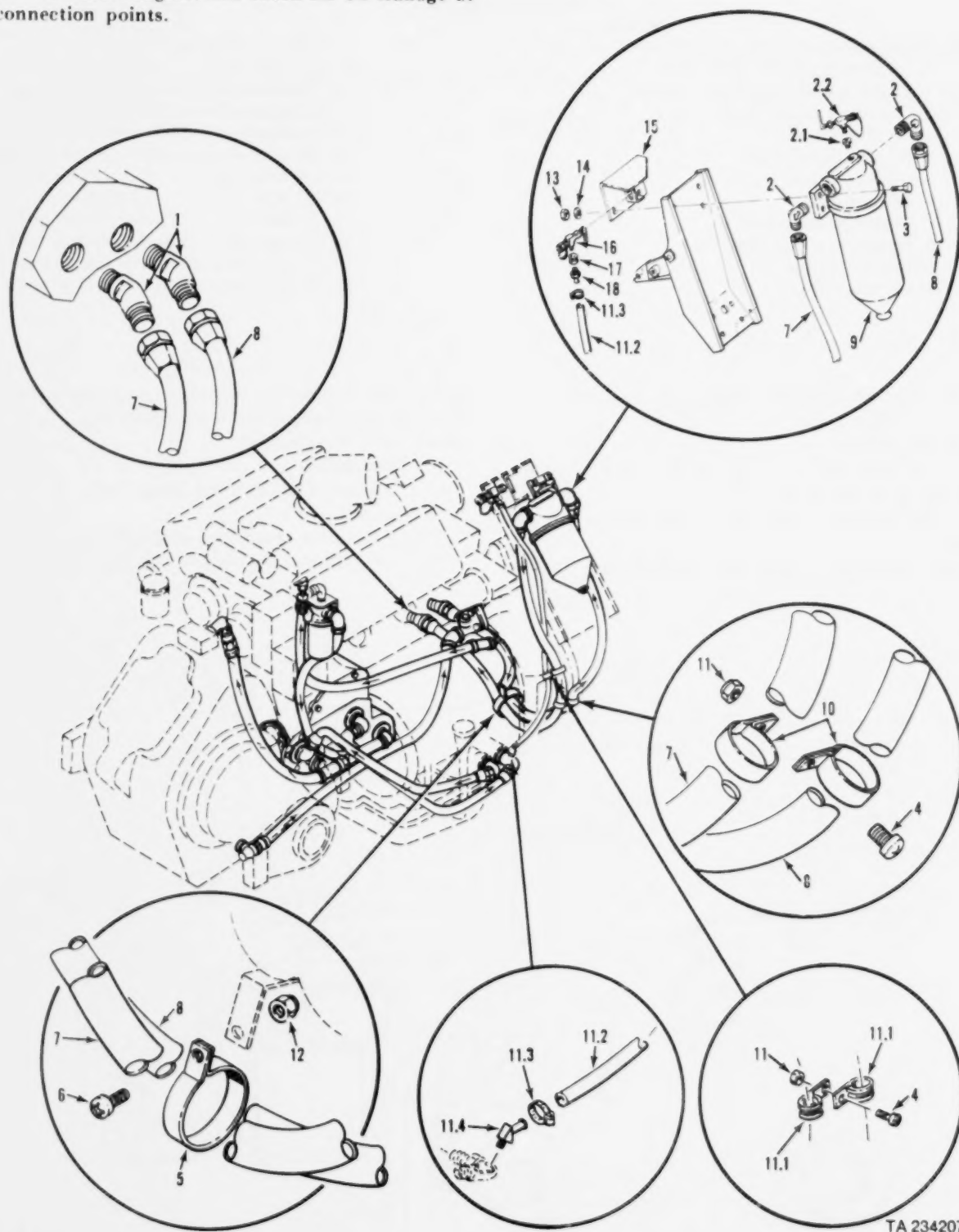
b. Inspection and Repair.

- (1) Inspect oil hoses for worn spots and damaged threads. Replace hoses that show either of these defects.
- (2) Inspect fittings for burred or damaged threads. Replace fittings that show either of these defects.

c. Installation.

- (1) Clean external threads of tapered pipe fittings, and apply sealing compound MIL-S-7916 sparingly.
- (2) Clean external threads of straight pipe fittings, and apply a light coat of antiseize compound MIL-A-907.
- (3) Install two elbows (2) on engine oil filter (9), and connect hoses (7 and 8).
- (4) Install two elbows (1) on engine block, and connect hoses.
- (5) Secure hoses to power plant with clamp (5), screw (6), and nut (12).
- (6) Secure hoses together with two clamps (10), screw (4), and nut (11).

(7) Start engine, and check for oil leakage at connection points.



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Figure 2-20. Engine oil filter hoses and fittings.

Legend to fig. 2-20.

- | | |
|--------------------------------------|---|
| 1 Engine oil inlet and outlet elbows | 11 Oil hose clamp nut |
| 2 Oil filter inlet and outlet elbows | 11.1 Oil hose clamp |
| 2.1 Engine oil AOAP sample bushing | 11.2 Transmission oil AOAP sample hose |
| 2.2 Engine oil AOAP sample valve | 11.3 Transmission oil AOAP sample clamp |
| 3 Oil filter screw | 11.4 Transmission oil AOAP sample elbow |
| 4 Oil hose clamp screw | 12 Oil hose clamp nut |
| 5 Oil hose clamp | 13 Oil filter nut |
| 6 Oil hose clamp | 14 Oil filter washer |
| 7 Engine oil inlet hose | 15 Transmission oil AOAP sample bracket |
| 8 Engine oil outlet hose | 16 Transmission oil AOAP sample valve |
| 9 Engine oil filter | 17 Transmission oil AOAP sample bushing |
| 10 Oil hose clamp | 18 Transmission oil AOAP sample union |

2-37. Air Box Drain Tube (fig. 2-21)

a. Removal.

(1) Disconnect drain tube at each rear air box fitting by unscrewing tube nut.

(2) Remove drain tube from drain collector can.

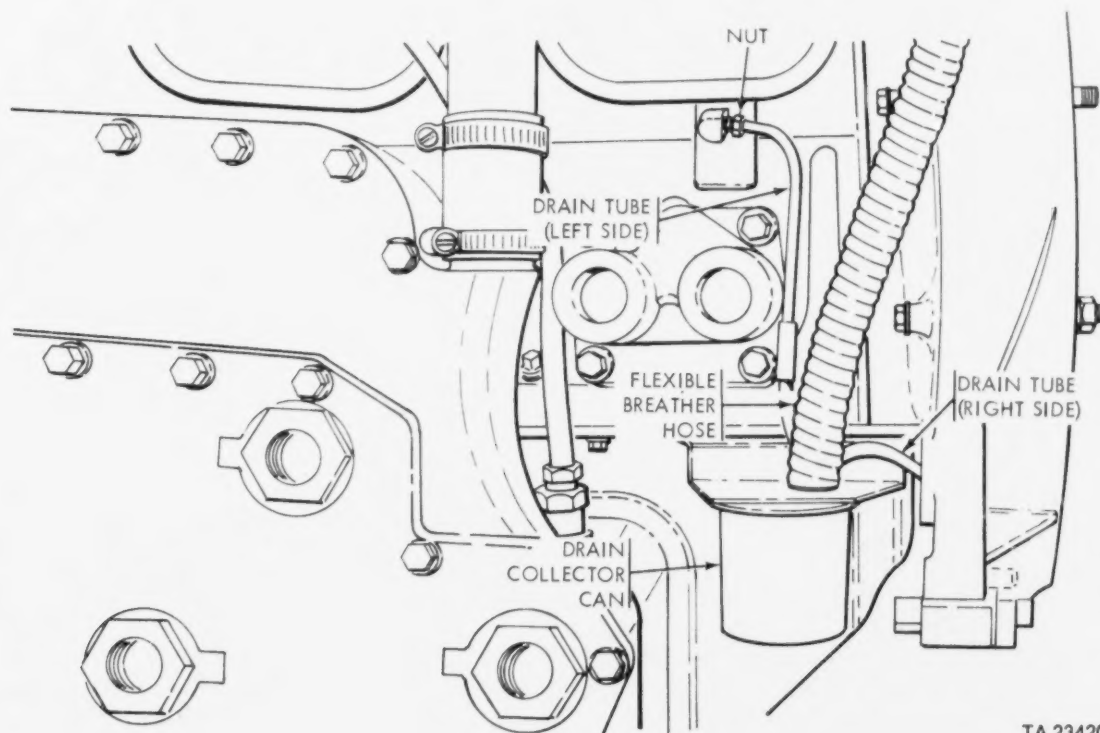
b. Cleaning, Inspection, and Repair. Inspect

drain tube for cracks, corrosion, and restricted air flow. Remove corrosion from drain tube. Replace drain tube if damaged.

c. Installation.

(1) Place free end of drain tube in drain collector can.

(2) Connect other end of drain tube to each rear air box fitting, and secure with tube nut.



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Figure 2-21. Air box drain tubes.

**2-38. Air Box Drain Crankcase Breather
Collector Can**
(fig. 2-22)

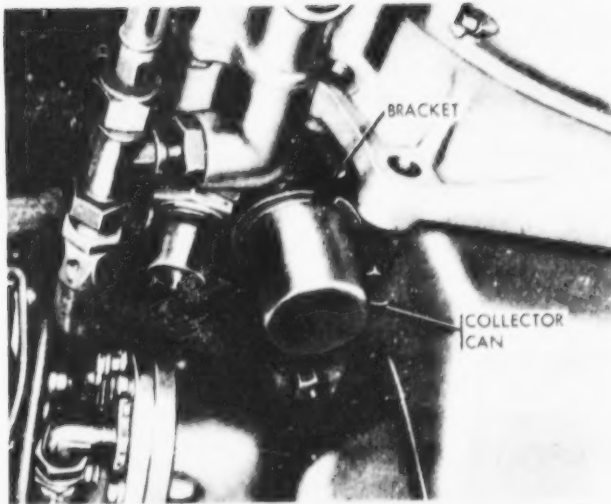
a. Removal.

- (1) Remove collector can from bracket by turning collector can counterclockwise.
- (2) Remove element from collector can by lifting element out.

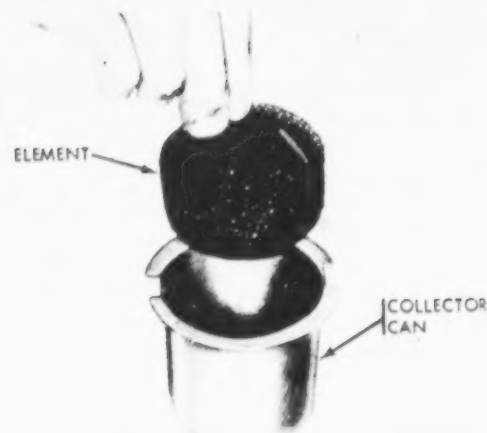
b. Cleaning. Clean collector can and element with solvent.

c. Installation.

- (1) Install element in collector can flush with bottom of can.
- (2) Install can on bracket by turning can clockwise.



A-COLLECTOR CAN



B-COLLECTOR CAN AND ELEMENT

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Figure 2-22. Air box drain and crankcase breather collector can.

2-39. Engine Crankcase Breather Hose

(fig. 2-23)

a. Removal.

(1) Disconnect hose clamp, and remove flexible breather hose from valve cover ventilation outlet.

(2) Remove two bolts, lock washers, and clamps securing hose to engine block.

(3) Remove hose from collector can (fig. 2-21).

b. Inspection and Repair. Inspect hose for tears and worn or deformed condition. Replace hose that shows any of these defects.

c. Installation.

(1) Attach flexible breather hose to valve cover ventilation outlet, and secure with clamp.

(2) Install other end of hose in collector can (fig. 2-21).

(3) Secure hose to engine block with two clamps, bolts, and lock washers.

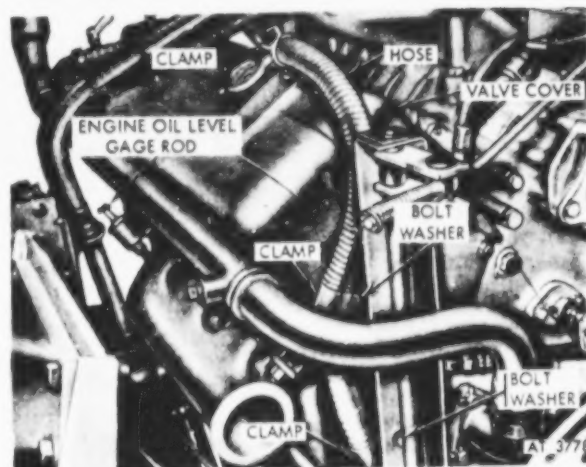


Figure 2-23. Engine crankcase breather hose.

2-40. Engine Oil Filler Cap and Tube (fig. 2-24)

a. Removal.

(1) Remove screw (10) and nut (11), and remove cap chain (12) from tube.

(2) Rotate filler cap (13) counterclockwise, and remove cap from tube.

(3) Loosen two tube clamps (9) securing tube to engine elbow (8).

(4) Remove two screws (7), nuts (6), and clamps (4), and remove tube from rear mounting bracket (5) and front mounting bracket (14).

b. *Inspection and Repair.* Inspect filler cap and

tube for cracks, dents, and deformation. Replace cap or tube that shows any one of these defects.

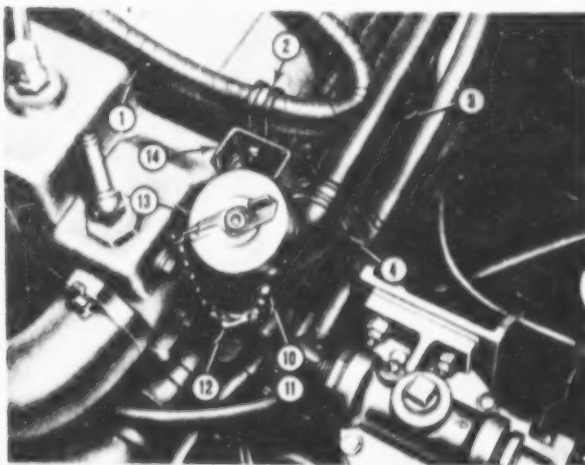
c. Installation.

(1) Position filler tube (3) to engine elbow (8), rear mounting bracket (5), and front mounting bracket (14), and secure to brackets with two clamps (4), screws (7), and nuts (6).

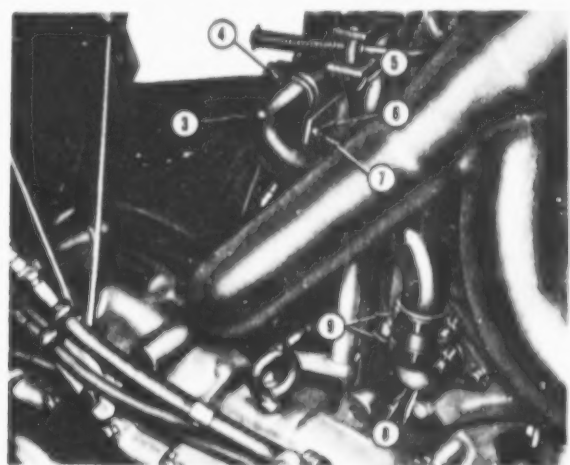
(2) Tighten two clamps (9) to secure tube to engine elbow.

(3) Install filler cap (13) on tube, and turn clockwise to secure.

(4) Position cap chain (12) to tube, and secure with screw (10) and nut (11).



A-ENGINE OIL FILLER TUBE CAP



B-ENGINE OIL FILLER TUBE ELBOW

AT 3779

- 1 Power plant wiring harness
- 2 Harness clamp
- 3 Engine oil filler tube
- 4 Tube clamp
- 5 Rear mounting bracket
- 6 Clamp nut
- 7 Clamp screw

- 8 Engine elbow
- 9 Elbow tube clamp
- 10 Cap chain screw
- 11 Cap chain nut
- 12 Filler cap chain
- 13 Filler cap
- 14 Front mounting bracket

Figure 2-24. Engine oil filler cap and tube.

2-41. Engine Oil Level Gage Rod and Tube

(fig. 2-23)

a. Removal.

(1) Turn oil level gage rod counterclockwise, and remove from tube.

(2) Remove screw securing clamp to coolant pump, and remove clamp.

(3) Unscrew nut securing tube to engine, and remove tube.

b. *Inspection and Repair.* Inspect gage rod for cracks and deformation. Replace rod that shows either of these defects.

c. Installation.

(1) Position tube on engine, and secure nut.

(2) Position clamp on tube, and secure to coolant pump with screw.

(3) Insert gage rod in tube, and secure by turning clockwise.

2-42. Deleted

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Figure 2-25. Engine oil cooler housing and core.

2-43. Engine Exhaust Manifolds
(fig. 2-26)

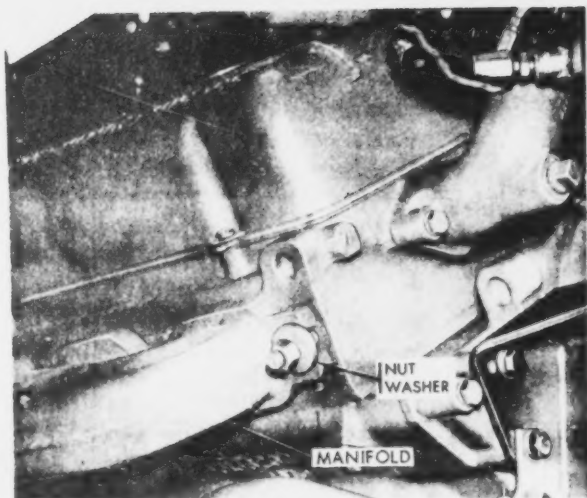
a. Removal.

- (1) Remove clamp securing crossover pipe to exhaust manifold on right or left side of engine.
- (2) Rotate crossover pipe in ball socket joint, and slip connections until crossover pipe clears manifold.
- (3) Remove four stud nuts and washers securing manifold to engine.
- (4) Remove manifold and gasket from engine. Discard gasket.

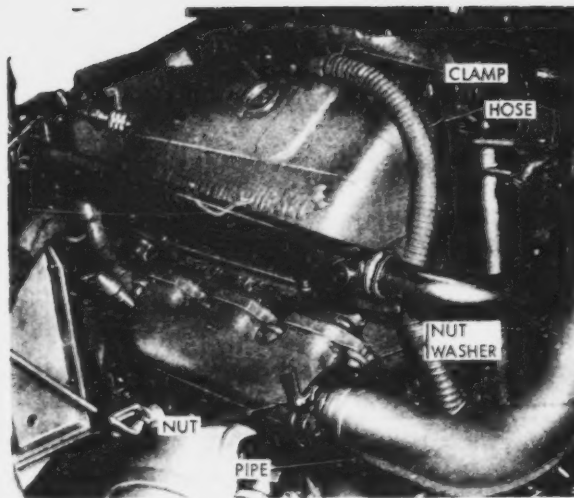
b. Inspection and Repair. Inspect manifold for cracks and warped machined surfaces. Replace manifold that shows either of these defects.

c. Installation.

- (1) Position manifold and new gasket on engine, and secure with four washers and stud nuts. Tighten stud nuts to 30 to 35 pound-feet torque.
- (2) Install crossover pipe on manifold, and secure with clamp. Tighten clamp nut to 16 to 18 pound-feet torque.



A-RIGHT MANIFOLD



B-LEFT MANIFOLD

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Figure 2-26. Exhaust manifold.

Section IX. FUEL, AIR INTAKE, AND EXHAUST SYSTEMS

2-44. General

a. Scope. This section contains instructions for removal, cleaning, inspection and repair, and installation of the fuel system, air intake system, and exhaust system components described in *b* below; and for draining the fuel system.

b. Description.

(1) *Fuel system.* The fuel system (fig. 2-27) consists of a fuel compartment which is an integral part of the hull, a fuel vent, two electric fuel pumps, air separator tank, primary fuel filter, engine fuel pump, secondary fuel filter, fuel injectors, and connecting fuel lines and passages in the cylinder heads. The fuel compartment is located at the rear of the carrier in the launcher equipment area. The fuel compartment is filled through the fuel filler located at the left rear of the carrier, and is drained through a fuel drain located in the hull under the center tailgate hinge. The entire system is vented by a fuel vent valve near the right rear fender and a

vacuum breaker valve at the right rear power plant bulkhead. The engine fuel pump, fuel injectors, fuel manifolds, and passages are an integral part of the engine. The two electric fuel pumps, mounted at the rear of the power plant compartment, and the air separator tank, mounted on the hull at the left rear side of the power plant compartment, insure delivery of fuel through the primary and secondary fuel filters to the engine fuel system. Air in the fuel system is removed by the air separator tank. Fuel enters the engine fuel system from the secondary fuel filter. Surplus fuel is returned from the fuel injectors to the fuel compartment by way of passages and fuel lines in the cylinder heads and the return fuel line. Fuel for air box heater is pumped by a hand pump from the secondary fuel filter into the accumulator (early M730). When the solenoid valve of the air box heater is actuated, the accumulator furnishes fuel to the engine air box where it is ignited.

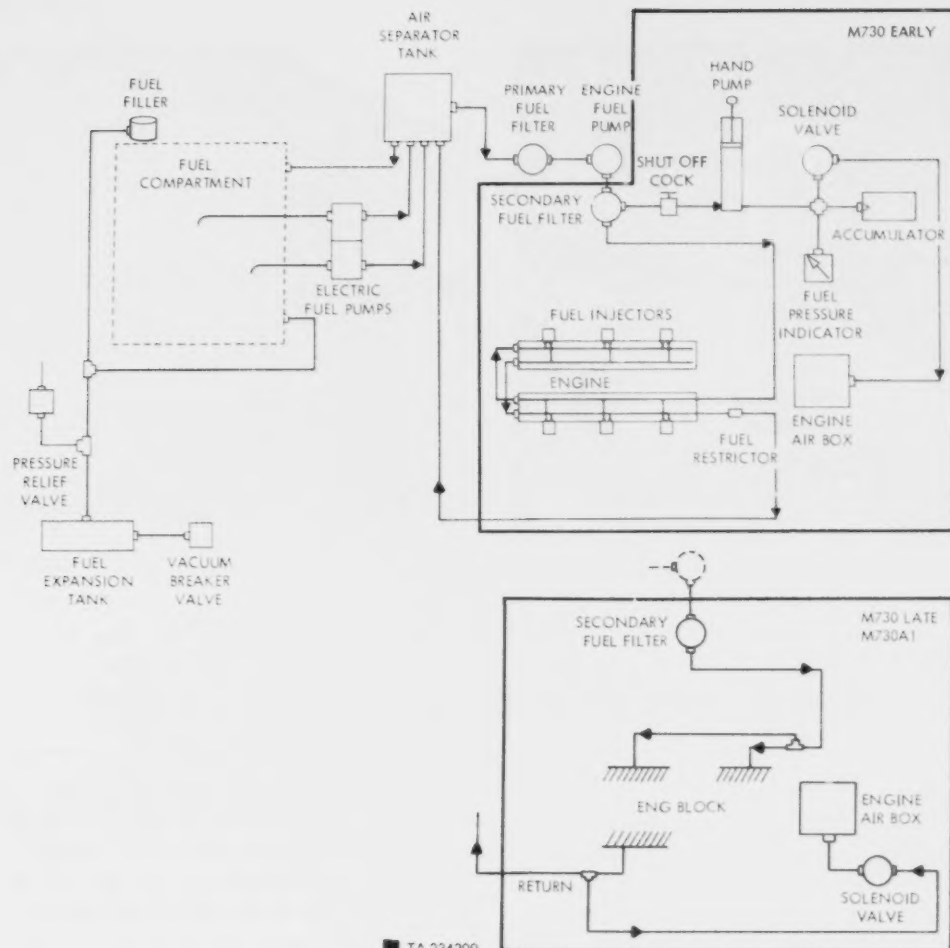


Figure 2-27. Fuel system diagram.

(2) *Air intake system.* Air is drawn in through the inlet on the air cleaner, filtered through the air cleaner element, and passes through a flexible hose to the engine. On carriers after C-308, air cleaner element condition is monitored by an air cleaner indicator located in the cab behind the driver's seat. Air is discharged at the outlet side of the blower, creating air pressure in the air box surrounding the engine cylinders. The pressurized air flows through ports in the engine cylinders where exhaust gases are removed and fresh air for combustion is supplied. The air cleaner head is mounted on the bottom of the transverse beam above the engine. Four latches secure the air cleaner case, containing the element, to the air cleaner head. The flexible hose is secured to the air cleaner head and to the engine air inlet by two clamps.

(3) *Exhaust system.* Burned fuel fumes are exhausted from the engine combustion chamber

through the left and right engine exhaust manifolds, through left and right crossover pipes, muffler, and out the duct mounted on top of the muffler (M730) or exhaust ducts (M730A1). The crossover pipes extend from the rear of the engine manifolds to one main exhaust pipe. The crossover pipes are joined to the main exhaust pipe with a ball-and-socket-type joint. The exhaust muffler is bolted in place behind the radiator (M370) and is equipped with an exhaust duct through which exhaust gases escape. Cooling air from the fan moving around the muffler partially cools the engine exhaust gases before escaping through the exhaust outlet elbow. The muffler for the M730A1 is mounted on the rear bulkhead of the power plant compartment. Exhaust gases escape through exhaust ducts, which are routed through the radiator compartment.

c. *Torque Wrench Specification.* Refer to table 2-14 for torque tightness readings for the more critical points of the fuel, air intake, and exhaust systems.

Table 2-14. Fuel, Air Intake and Exhaust Systems
Torque Wrench Specifications

Fig. No.	Key No.	Location	Pound-feet torque
2-38	11	Fuel compartment access cover screw.	3-4
2-39	4	Fuel compartment tube mounting nut.	45-55
2-39	36	Fuel compartment pick-up tube nut.	45-55
2-40	21	Fuel expansion tank mounting nut.	22-27
2-53	2	Nut on clamp securing exhaust pipe to muffler.	16-18
2-53	3	Nut on clamp securing crossover pipe to engine exhaust manifold.	16-18
2-53	14	Nut on clamp securing flange to muffler.	5-6
2-53.1	17	Nut on clamp securing crossover pipe to engine exhaust manifold.	16-18
2-53.1	13	Nut on clamp securing flange to muffler.	16-18

2-45. Engine Fuel Pump (fig. 2-28)

a. Fuel Flow Check.

(1) Disconnect fuel return hose at power plant quick disconnect (M, fig. 2-16), remove disconnect coupling half from engine hose, and hold open end of hose in suitable (1 gallon minimum) container.

(2) Start and run engine at 1,200 rpm (TM 9-1450-585-10), and measure engine fuel return flow for 1 minute. Fuel flow should be approximately $\frac{1}{2}$ gallon per minute (gpm) for proper engine performance.

(3) Immerse end of fuel hose into fuel. If air bubbles rise to surface, it indicates a leak on the suction side of pump. Shut off engine, and tighten all connections between air separator tank and engine fuel pump so no air will be drawn into fuel system.

(4) If no bubbles appear and fuel flow is below $\frac{1}{2}$ gpm, shut off engine, and replace primary fuel filter element (para 2-58).

(5) Start and run engine at 1,200 rpm, and recheck fuel flow. If flow is still below $\frac{1}{2}$ gpm, shut off engine, and replace secondary fuel filter element (para 2-58).

(6) Check fuel flow again. If flow is still below $\frac{1}{2}$ gpm, shut off engine, and replace fuel pump (b and d below).

b. Fuel Pump Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Disconnect inlet hose (5, fig. 2-28) and outlet hose (1) from fuel pump (6).

(3) Remove two cap screws (2) and washers (3), and remove shield (4).

(4) Remove cap screw (7) and washer (8), and remove fuel pump (6) and gasket (9). Discard gasket.

(5) If fuel pump is to be replaced, remove hose fittings, and install on replacement pump.

c. Inspection and Repair.

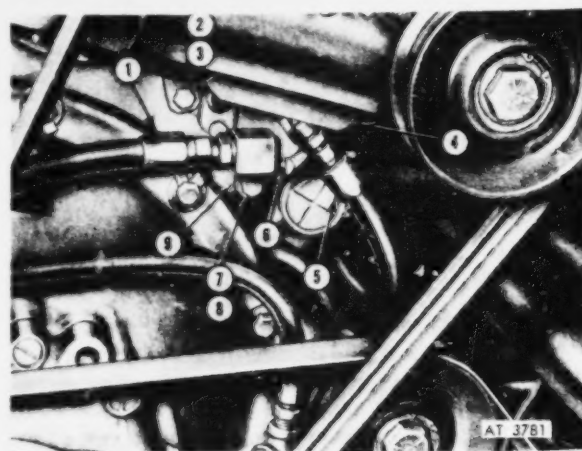
(1) Inspect fuel pump for cracks around housing and mounting flanges. Replace fuel pump that shows either of these defects.

(2) Inspect fuel pump shaft for binding and deformation. Replace fuel pump if shaft shows either of these defects.

d. Installation.

(1) Position fuel pump (6) with new gasket (9) on engine, locate drive coupling over square end of fuel pump drive shaft, and secure with washer (8) and cap screw (7).

(2) Install shield (4) and secure with two washers (3) and cap screws (2).



- | | |
|--------------------|-----------------------|
| 1 Outlet hose | 6 Fuel pump |
| 2 Shield cap screw | 7 Fuel pump cap screw |
| 3 Shield washer | 8 Fuel pump washer |
| 4 Fuel pump shield | 9 Fuel pump gasket |
| 5 Inlet hose | |

Figure 2-28: Engine fuel pump.

2-46. Air Separator Tank (fig. 2-29)

a. Removal.

NOTE

Make certain master switch and fuel pump switch are OFF.

(1) Place suitable container under air separator tank (11), and on carriers C-1 through C-39, remove drain plug (21, fig. 2-30) or on carriers after C-39, open drain cock (21, fig. 2-31), and allow fuel to drain from tank.

NOTE

The air separator tank can be removed without draining the tank while in the carrier by following steps (2) through (8) below, and making certain to keep the top of the tank up at all times. Drain tank before installing in carrier.

(2) Disconnect battery negative lead (para 2-98).

(3) Disconnect tank-to-fuel compartment tube assembly (1) and engine return-to-tank fuel tube assembly (10) at top of tank.

(4) Disconnect two electric pump-to-tank fuel tube assemblies (2) at top of tank.

(5) Disconnect tank-to-primary filter fuel hose (3) at top of tank.

(6) Remove two T-bolt assembly nuts (6), release trunnions (7), and separate securing bands (8) from tank.

(7) Remove tank from carrier.

b. Inspection and Repair.

(1) Inspect air separator tank for cracks, leaks, and deformation. If leak is suspected in air separator tank, perform pressure test (d below). Replace air separator tank that shows any of these defects.

(2) Inspect fittings for distortion, damaged threads, and breaks. Replace fittings that show any of these defects.

(3) Inspect T-bolt and trunnion assemblies for damaged threads, and bands for cracks and breaks. Replace strap assembly that shows any of these defects.

c. Installation.

(1) Clean external threads of screws and straight pipe fittings, and apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761).

(2) Clean tapered pipe fittings and apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426).

(3) Position air separator tank (11) in hull compartment.

(4) Position securing bands (8) on tank, and fasten with two trunnions (7) and T-bolt assembly nuts (6).

(5) Connect two electric pump-to-tank fuel tube assemblies (2) to top of tank.

(6) Connect tank-to-fuel compartment tube assembly (1) and engine return-to-tank fuel tube assembly (10) to top of tank.

(7) Connect tank-to-primary filter fuel hose (3) to top of tank.

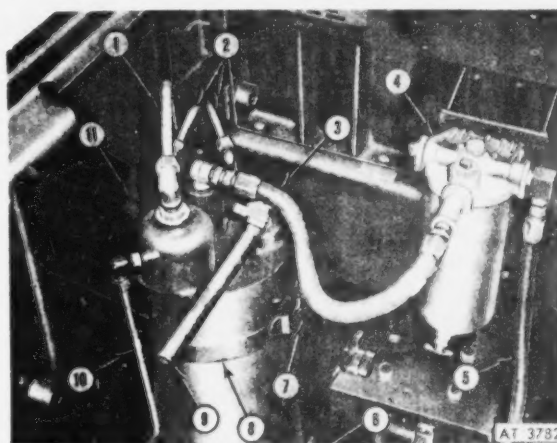
(8) On carriers C-1 through C-39, install drain plug (21, fig. 2-30) or on carriers after C-39, close drain cock (21, fig. 2-31) at bottom of tank.

(9) Connect battery negative lead (para 2-98).

(10) Turn master and fuel pump switches on (TM 9-1450-585-10).

(11) Start and run engine at 1,200 rpm, and check around connections and mating surfaces for fuel leaks.

d. Test. Submerge air separator tank in water, and apply 2 psi of air to tank. No leakage is allowed. Replace air separator tank if leak is detected.



- 1 Tank-to-fuel compartment tube assembly
- 2 Electric pump-to-tank fuel tube assembly
- 3 Tank-to-primary fuel filter hose
- 4 Primary fuel filter
- 5 Primary filter-to-engine pump fuel hose
- 6 Strap assembly T-bolt nut
- 7 Strap assembly trunnion
- 8 Strap assembly band
- 9 Air bleed vent hose
- 10 Engine return-to-tank fuel tube assembly
- 11 Air separator tank

Figure 2-29. Air separator tank.

2-47. Air Separator Tank Tubes, Hoses and Fittings (fig. 2-30 and 2-31)

a. Removal.

NOTE

Make certain master switch and fuel pump switch are OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) For removal of air separator tubes, hoses, and fittings, see figure 2-30 for carriers C-1 through C-39, figure 2-31 for early model carriers after C-39, or figure 2-31.1 for late model carriers after C-39.

b. Inspection and Repair.

(1) Inspect hoses for cracks and deterioration. Replace hoses that show either of these defects.

(2) Inspect tubes for crimps, cracks, and damaged ends. Replace tubes that show any of these defects.

(3) Inspect fittings and connections for worn areas and damaged threads. Replace parts that show either of these defects.

c. Installation.

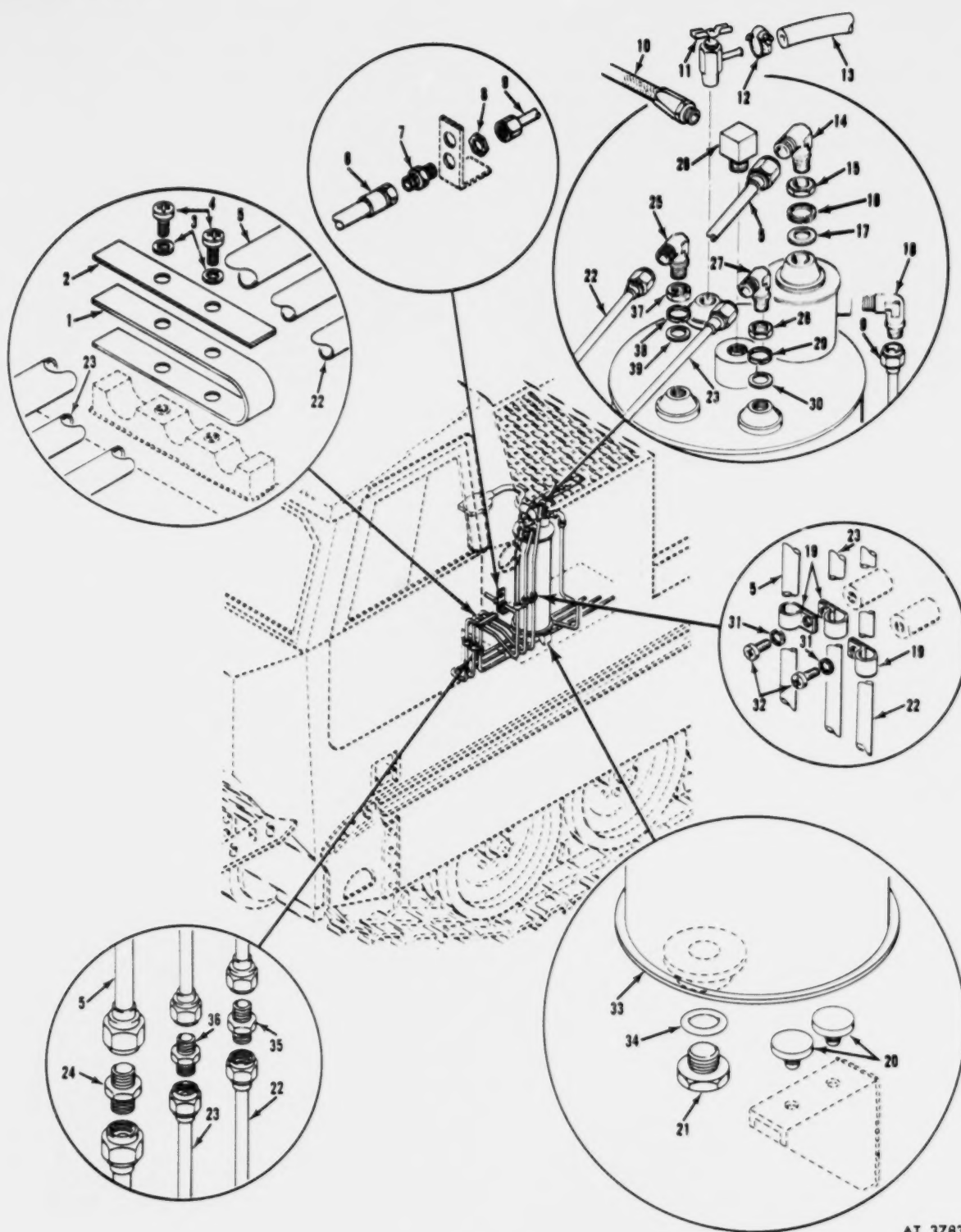
(1) Clean tapered pipe fittings, and apply a light coat of sealing compound MIL-S-45180.

(2) Clean external threads of screws and straight pipe fittings, and apply a light coat of antiseize compound MIL-A-907.

(3) For installation of air separator tubes, hoses, and fittings, see figure 2-30 for carriers C-1 through C-39, figure 2-31 for early model carriers after C-39, or figure 2-31.1 for late model carriers after C-39.

(4) Connect battery negative lead (para 2-98).

d. Test. Start and run engine at 1,200 rpm, and check all connections for fuel leaks.



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Figure 2-30. Air separator tank tubes, hoses, and fittings - carriers C1 through C39.

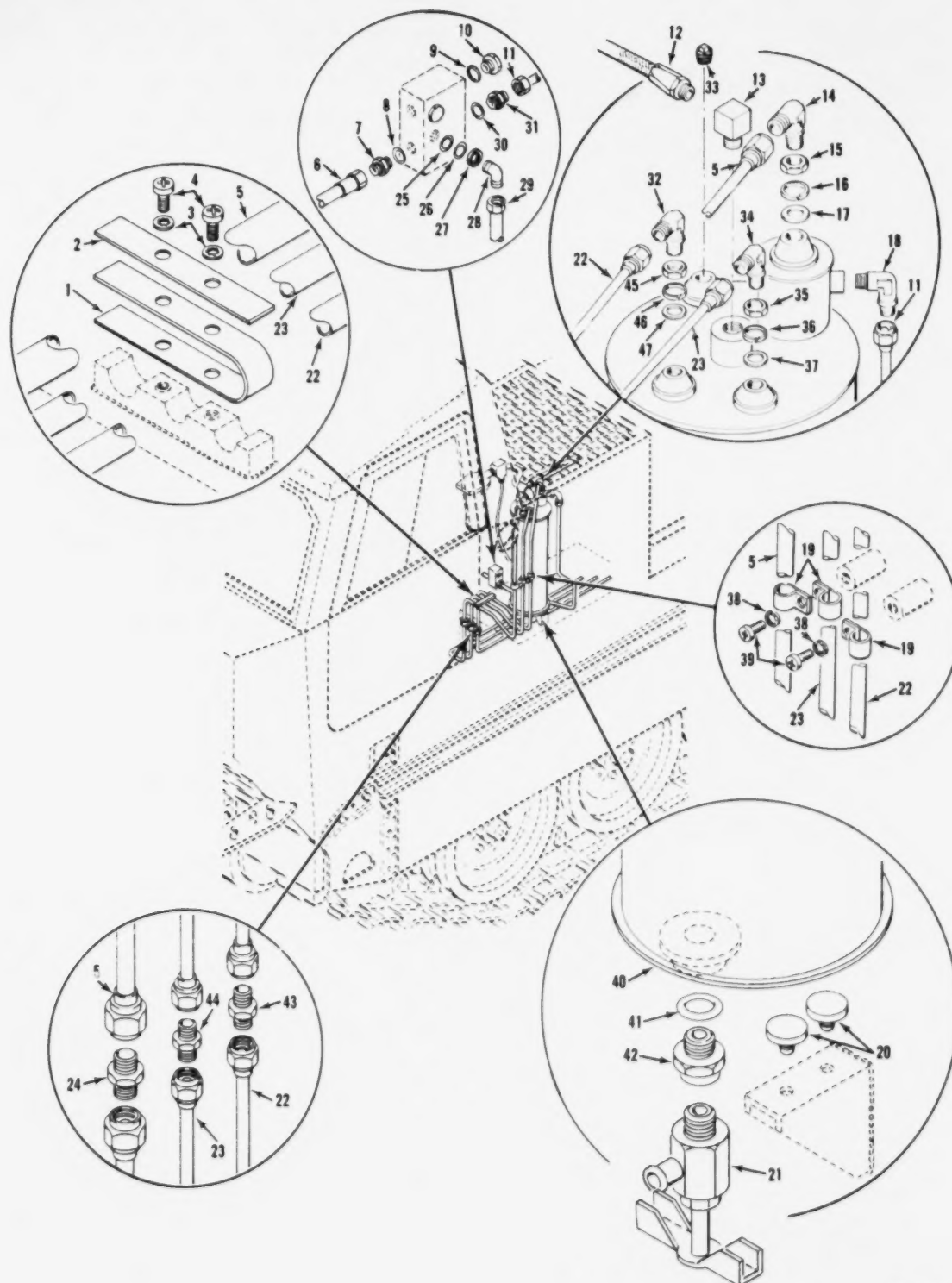
Legend to fig. 2-30.

- 1 Tube cushioning rubber strip
- 2 Tube retaining strip
- 3 Retaining strip washer
- 4 Retaining strip washer
- 5 Air separator tank-to-fuel compartment return line
- 6 Engine-to-air separator tank return hose
- 7 Return hose union
- 8 Return hose union nut
- 9 Engine-to-air separator tank return tube
- 10 Air separator tank-to-primary fuel filter hose
- 11 Air bleed cock
- 12 Vent hose clamp
- 13 Air bleed vent hose
- 14 Return tube elbow
- 15 Return tube elbow retaining nut
- 16 Elbow packing retaining ring
- 17 Return tube elbow packing
- 18 Air separator tank fuel inlet elbow
- 19 Fuel line cushioning clamp
- 20 Air separator tank support spacer
- 21 Air separator tank drain plug
- 22 Right fuel pump-to-air separator tank line
- 23 Left fuel pump-to-air separator tank line
- 24 Return line union
- 25 Right inlet elbow
- 26 Primary fuel filter hose elbow
- 27 Left inlet elbow
- 28 Left inlet elbow retaining nut
- 29 Elbow packing retaining ring
- 30 Left inlet elbow packing
- 31 Fuel line cushioning clamp washer
- 32 Fuel line cushioning clamp screw
- 33 Air separator tank
- 34 Drain plug packing
- 35 Right fuel pump line union
- 36 Left fuel pump line union
- 37 Right inlet elbow retaining nut
- 38 Elbow packing retaining ring
- 39 Right inlet elbow packing

Figure 2-30. Air separator tank tubes, hoses and fittings - carriers C1 through C39 - continued

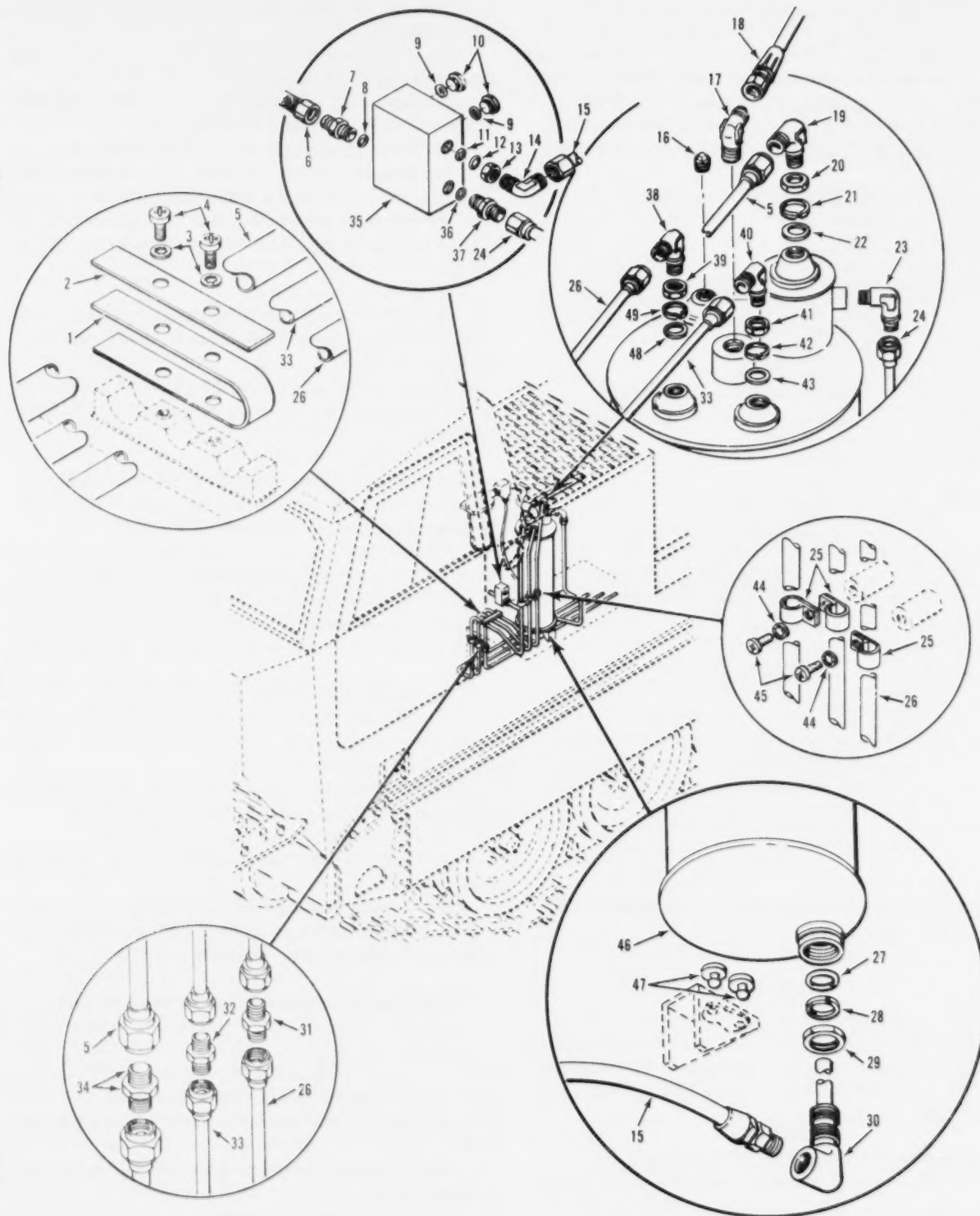
Legend to fig. 2-31

- 1 Tube cushioning rubber strip
- 2 Tube retaining strip
- 3 Retaining strip washer
- 4 Retaining strip screw
- 5 Air separator tank-to-fuel compartment return line assembly
- 6 Engine-to-air separator tank return hose assembly
- 7 Return hose union
- 8 Return hose union packing
- 9 Manifold plug packing
- 10 Manifold plug
- 11 Engine-to-air separator tank return tube assembly
- 12 Air separator tank-to-primary fuel filter hose assembly
- 13 Primary fuel filter hose elbow
- 14 Return tube elbow
- 15 Return tube elbow retaining nut
- 16 Return tube elbow packing retaining ring
- 17 Return tube elbow packing
- 18 Air separator tank fuel inlet elbow
- 19 Fuel line clamp
- 20 Air separator tank support spacer
- 21 Drain cock
- 22 Right fuel pump-to-air separator tank line assembly
- 23 Left fuel pump-to-air separator tank line assembly
- 24 Return line union
- 25 Primary fuel filter-to-manifold inlet hose packing
- 26 Primary fuel filter-to-manifold inlet hose packing retaining ring
- 27 Primary fuel filter-to-manifold inlet hose retaining nut
- 28 Primary fuel filter-to-manifold inlet hose elbow
- 29 Primary fuel filter-to-manifold inlet hose assembly
- 30 Engine-to-air separator tank return tube packing
- 31 Engine-to-air separator tank return tube union
- 32 Right inlet elbow
- 33 Air separator tank plug
- 34 Left inlet elbow
- 35 Left inlet elbow retaining nut
- 36 Left inlet elbow packing retaining ring
- 37 Left inlet elbow packing
- 38 Fuel line clamp washer
- 39 Fuel line clamp screw
- 40 Air separator tank assembly
- 41 Drain cock adapter packing
- 42 Drain cock adapter
- 43 Right fuel pump line union
- 44 Left fuel pump line union
- 45 Right inlet elbow retaining nut
- 46 Right inlet elbow packing retaining ring
- 47 Right inlet elbow packing



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Figure 2-31. Air separator tank, tubes, hoses, and fittings - early model carriers after C-39.



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Figure 2-31.1. Air separator tank, tubes, hoses, and fittings - late model carriers after C-39.

TM 9-1450-585-20

Legend to fig. 2-31.1:

- 1 Tube cushioning rubber strip
- 2 Tube retaining strip
- 3 Retaining strip washer
- 4 Retaining strip screw
- 5 Air separator tank-to-fuel compartment return line assembly
- 6 Fuel return hose assembly
- 7 Return hose union
- 8 Return hose union packing
- 9 Manifold plug packing
- 10 Manifold plug
- 11 Heater fuel supply hose packing
- 12 Elbow packing retaining ring
- 13 Elbow retaining nut
- 14 Return line elbow
- 15 Heater fuel supply hose
- 16 Air separator tank plug
- 17 Primary fuel filter hose elbow
- 18 Air separator tank-to-primary fuel filter hose assembly
- 19 Return tube elbow
- 20 Return tube elbow retaining nut
- 21 Return tube elbow packing retaining ring
- 22 Return tube elbow packing
- 23 Air separator tank fuel inlet elbow
- 24 Engine-to-air separator tank return tube assembly
- 25 Fuel line clamp
- 26 Right fuel pump-to-air separator tank line assembly
- 27 Heater fuel line elbow packing
- 28 Heater fuel line ring
- 29 Heater fuel elbow nut
- 30 Heater fuel supply line elbow
- 31 Heater fuel elbow nut
- 32 Left fuel pump line union
- 33 Left fuel pump-to-air separator tank line assembly
- 34 Return line union
- 35 Connector
- 36 Engine-to-air separator tank return tube packing
- 37 Engine-to-air separator tank return tube union
- 38 Right inlet elbow
- 39 Right inlet elbow retaining nut
- 40 Left inlet elbow
- 41 Left inlet elbow retaining nut
- 42 Left inlet elbow packing retaining ring
- 43 Left inlet elbow packing
- 44 Fuel line clamp washer
- 45 Fuel line clamp screw
- 46 Air separator tank assembly
- 47 Air separator tank support spacer
- 48 Right inlet elbow packing
- 49 Right inlet elbow packing retaining ring

Figure 2-31.1. Air separator tank, tubes, hoses, and fittings - late model carriers after C-39 - continued.

2-48. Electric Fuel Pumps — Carriers C-1 through C-307

(fig. 2-32)

NOTE

Both fuel pumps are removed and installed in a similar manner. If fuel pumps fail due to excessive moisture, replace with waterproof fuel pumps (para 2-49.1).

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Disconnect fuel tube assemblies (3 and 4) from fuel pump (5).
- (3) Remove cap (1) and screw (14), and remove circuit 77A or 78A lead (13) from capacitor (11).
- (4) Remove two screws (24), washers (7), and

ground lead (8), and remove two clamps (6) from fuel pump (5).

(5) Remove nut (16), ground lead (8), and two washers (15) from capacitor (11).

(6) Remove fuel pump (5) with shield (10) and capacitor (11) from hull mounting.

(7) Move shield (10) away from fuel pump.

(8) Remove screw (22) and two washers (20), and disconnect lead (21) from capacitor (11).

(9) Remove screw (19) and two washers (17), disconnect lead (18), and remove fuel pump from shield.

b. Inspection and Repair.

(1) Inspect fuel pump housing for cracks and deformation. Replace fuel pump that shows either of these defects.

(2) Inspect clamps for cracks and excessive wear. Replace clamps that show either of these defects.

c. Installation.

(1) Position washer (20) and fuel pump lead (21) to capacitor connection inside shield (10), and secure with washer (20) and screw (22).

(2) Position washer (17) and fuel pump ground lead (18) to capacitor connection inside shield (10).

(3) Position washer (15) and capacitor ground lead (8) to capacitor (11), and secure leads (18 and 8) with washer (17), screw (19), washer (15), and nut (16).

(4) Install fuel pump (5) in shield (10).

(5) Position fuel pump and clamps (6) to hull mounting, and secure with two washers (7), lead (8), and two screws (24).

(6) Position circuit 77A or 78A lead (13) to capacitor (11), and secure with screw (14).

(7) Install cap (1) on lead connection.

(8) Connect fuel tube assemblies (3 and 4) to fuel pump.

(9) Connect battery negative lead (para 2-98).

(10) Start and run engine at 1,200 rpm, and check connections for fuel leaks.

NOTE

Test below applies to either electric fuel pump.

d. Test.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Disconnect pump-to-air separator tank fuel tube at tank.

(3) Install pressure gage in fuel line, and connect flexible hose of suitable length to reach outside of carrier.

(4) Provide clean container of suitable size to receive fuel.

- (5) Plug opening at air separator tank.
- (6) Connect battery negative lead (para 2-98).
- (7) Turn master switch ON.
- (8) Turn fuel pump switch ON, and check pressure and flow. Pressure should read between 5 and 8 psig with a 40 to 60 gallon per hour flow.
- (9) Turn fuel pump switch OFF after completion of test.
- (10) Turn master switch OFF.
- (11) If fuel pump does not meet requirements of (8) above, replace pump (*a* and *c* above).
- (12) Disconnect battery negative lead (para 2-98).
- (13) Remove plug from air separator tank.
- (14) Remove flexible hose and pressure gage from fuel line.
- (15) Connect pump-to-air separator tank fuel tube at tank.
- (16) Connect battery negative lead (para 2-98).
- (17) Turn master switch ON.
- (18) Turn fuel pump switch ON, and check for fuel leaks.
- (19) If no leaks exist, turn fuel pump switch OFF.
- (20) Turn master switch OFF.
- (21) To further check operation of electric fuel pump, refer to electrical troubleshooting, paragraph 2-25.

2-49 Electric Fuel Pumps — After Carrier C-307

(fig. 2-33)

NOTE

Maintenance on both fuel pumps is similar. The following applies to the right fuel pump.

a. Service. Refer to paragraph 3-9a.

b. Flow and Pressure Test.

NOTE

Make certain master switch is OFF.

- (1) Disconnect circuit 78A lead (16) from right fuel pump (3).
- (2) Disconnect right pump outlet hose (17) from right pump outlet adapter (6), and hold open end of hose in suitable (1 gallon minimum) container.
- (3) Turn master switch and fuel pump switch ON, and measure fuel flow for 1 minute. Fuel flow should be $1\frac{1}{4}$ to $2\frac{1}{2}$ quarts per minute (18 to 35 gph) if pump is functioning properly.
- (4) Immerse end of fuel hose in fuel. If air bubbles rise to surface, it indicates a leak on suction side of pump. Turn master switch OFF, and tighten all connections between fuel compartment and pump so no air will be drawn into system.

(5) If no bubbles appear and fuel flow is below $1\frac{1}{4}$ quarts per minute, turn master switch OFF, service fuel pump (para 3-9a), and check pickup tube in fuel compartment (para 2-54).

(6) Turn master switch ON, and recheck flow. If flow is still below $1\frac{1}{4}$ quarts per minute, turn master switch OFF, and replace fuel pump (*c* and *e* below).

(7) Install pressure gage in end of fuel hose. Turn master switch ON, and check fuel pressure. Fuel pressure is not within limits, turn master switch OFF, and replace fuel pump (*c* and *e* below).

(8) Remove pressure gage, and connect fuel hose (17) and circuit 78A lead (16).

c. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Disconnect circuit 78A lead (16) from right fuel pump (3).
- (3) Disconnect fuel hoses (4 and 17) from adapters (5 and 6).
- (4) Remove two screws (15) and three lock washers (14) securing right fuel pump (3) and pump capacitor to hull, and remove fuel pump. Discard washers.
- (5) Remove two hoses (4 and 17) and elbows (1 and 2) from right fuel pump (3).

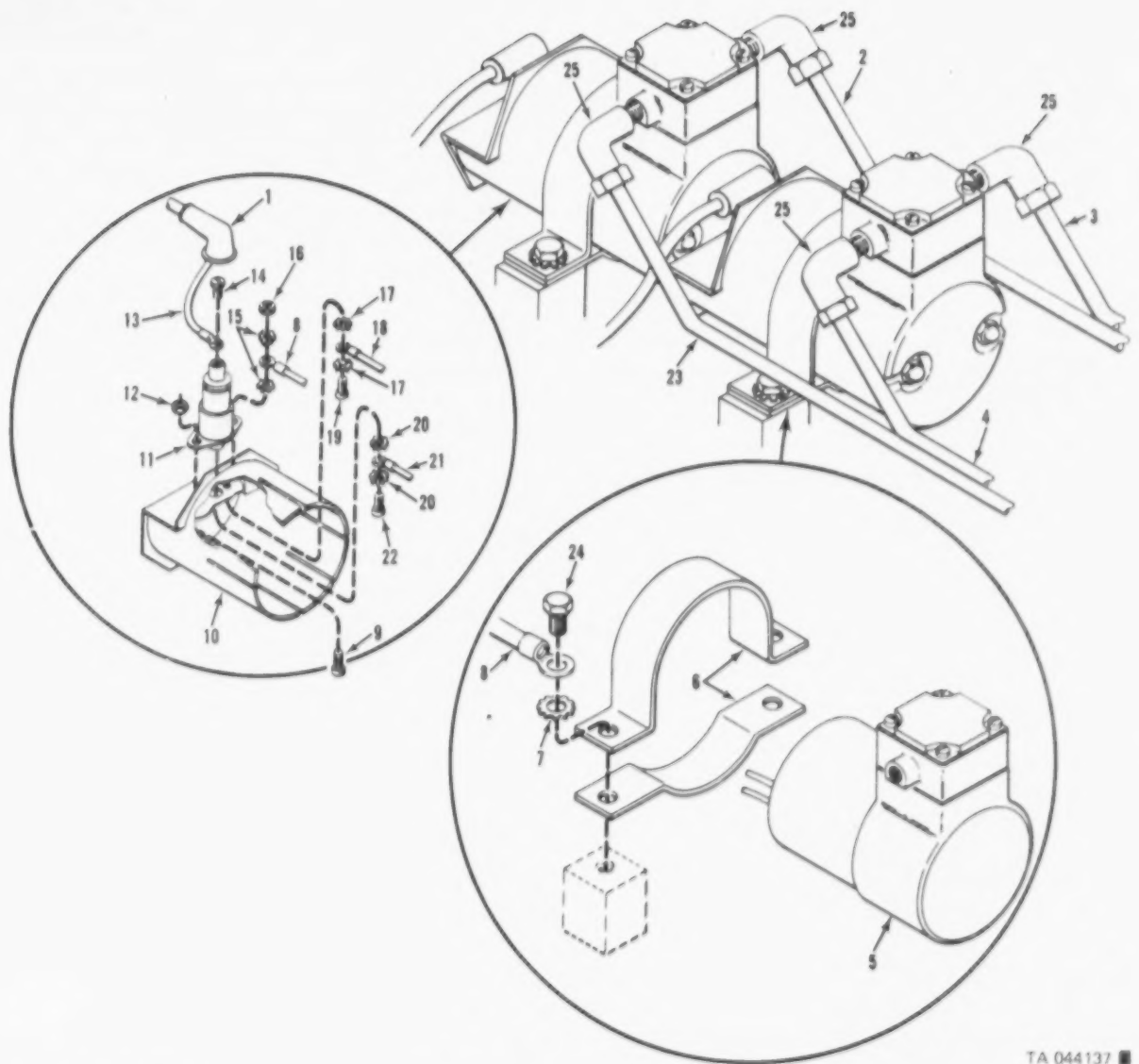
d. Inspection and Repair

(1) Inspect pump for dents in case and damaged inlet and outlet threads. Replace pump that shows either of these defects.

(2) Test fuel pump output flow and pressure (*b* above). Replace defective fuel pump.

e. Installation.

- (1) and NOTE. Deleted.
- (2) Apply a light coat of sealing compound MIL-S-7916 to all external pipe threads at installation.
- (3) Install two elbows (1 and 2) and hoses (4 and 17) on right fuel pump (3).
- (4) Position right fuel pump (3) and pump capacitor on hull or adapter mounting plate, and secure with three new lock washers (14) and two screws (15). Install one new lock washer (14) on each side of capacitor.
- (5) Connect fuel hoses (4 and 17) to adapters (5 and 6).
- (6) Connect circuit 78A lead (16) to right fuel pump (3).
- (7) Connect negative battery lead (para 2-98).
- (8) Turn master switch and fuel pump switch ON, and check operation of fuel pump.



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- | | | |
|---------------------------------------|-------------------------------|--|
| 1 Circuit lead rubber cap | 10 Fuel pump shield | 17 Fuel pump ground lead lock washer |
| 2 Right fuel pump inlet tube assembly | 11 Fuel pump capacitor | 18 Fuel pump ground lead |
| 3 Left fuel pump inlet tube assembly | 12 Capacitor nut | 19 Ground lead screw |
| 4 Left fuel pump outlet tube assembly | 13 Circuit 77A or 78A lead | 20 Fuel pump electrical lead lock washer |
| 5 Electric fuel pump | 14 Circuit lead machine screw | 21 Fuel pump electrical lead |
| 6 Fuel pump clamp | 15 Capacitor lock washer | 22 Fuel pump electrical lead machine screw |
| 7 Clamp lock washer | 16 Ground lead nut | 23 Right fuel pump outlet tube assembly |
| 8 Capacitor ground lead | | 24 Fuel pump clamp cap screw |
| 9 Capacitor screw | | 25 Fuel pump elbow |

Figure 2-32. Electric fuel pump - carriers C1 through C-307.

2-49.1 Replacement of Nonwaterproof Electric Fuel Pumps with Waterproof Electric Fuel Pumps

a. Removal.

NOTE

Make certain vehicle master switch is OFF.

- (1) Disconnect negative lead at battery.

- (2) Remove power compartment lower rear access plate.

- (3) Disconnect four fuel tubes (2, 3, 4, and 23, fig. 2-32) at fuel pumps.

- (4) Remove rubber cap (1) and screw (14), and disconnect circuits 77A and 78A leads (13) from capacitor.

- (5) Remove and keep four screws (24) and

washers (7) securing fuel pumps and clamps (6).

(6) Remove four elbows (25) from fuel pumps. Dispose of elbows and fuel pump clamps in accordance with existing regulations.

NOTE

The following disassembly instructions apply to either pump.

(7) Remove screw (19), two washers (17), lead (18), two washers (15), lead (8), and nut (16). Discard these parts.

(8) Remove screw (22), two washers (20), and lead (21). Separate pump (5) from capacitor and shield. Discard screw, washers, and lead. Dispose of pump in accordance with existing regulations.

(9) Remove screw (9) and nut (12), and separate capacitor (11) from shield (10). Discard screw, nut, and capacitor. Dispose of shield in accordance with existing regulations.

b. Modification. Cut off tubes (2, 3, 4, and 23 figure 2-32) to the lengths shown in figure 2-32.1. Break sharp edges after cutting. Throw away cut off ends of tubing, sleeves, and nuts.

NOTE

It may be necessary to loose the clamps nearest the cutting point to permit cutting.

c. Installation. (2-33.1)

NOTE

Refer to Table 2-14.1 for replacement parts.

(1) Position two fuel pumps (2) on adapter mounting plate (1). Install pumps to plate with four screws (4) and six washers (3). Place one washer on each side of capacitor mounting bracket. Fuel pumps are to be placed with domed end forward and electrical outlet on top.

(2) Apply sealing compound NSN 8030-00-543-4384 sparingly to four fuel pump inlets and outlets. Install four elbows (5). Point elbows to left side of vehicle.

(3) Apply sealing compound NSN 8030-00-543-4384 sparingly to external threads of fittings on four hose assemblies (6). Connect hoses to fuel pump elbows (5).

(4) Position assembled adapter plate on stiffener beam and secure with the screws and washers retained from *a*(7) above.

(5) Position nut (7) and sleeve (8) on each cut off tube assembly. Install four adapters (9) and connect four hose assemblies to adapters. Tighten all connections, and any mounting hardware that may have been loosened.

(6) Cut off and throw away terminal NSN 5940-00-143-4780 from electrical leads circuits 77A and 78A (13, fig. 2-32).

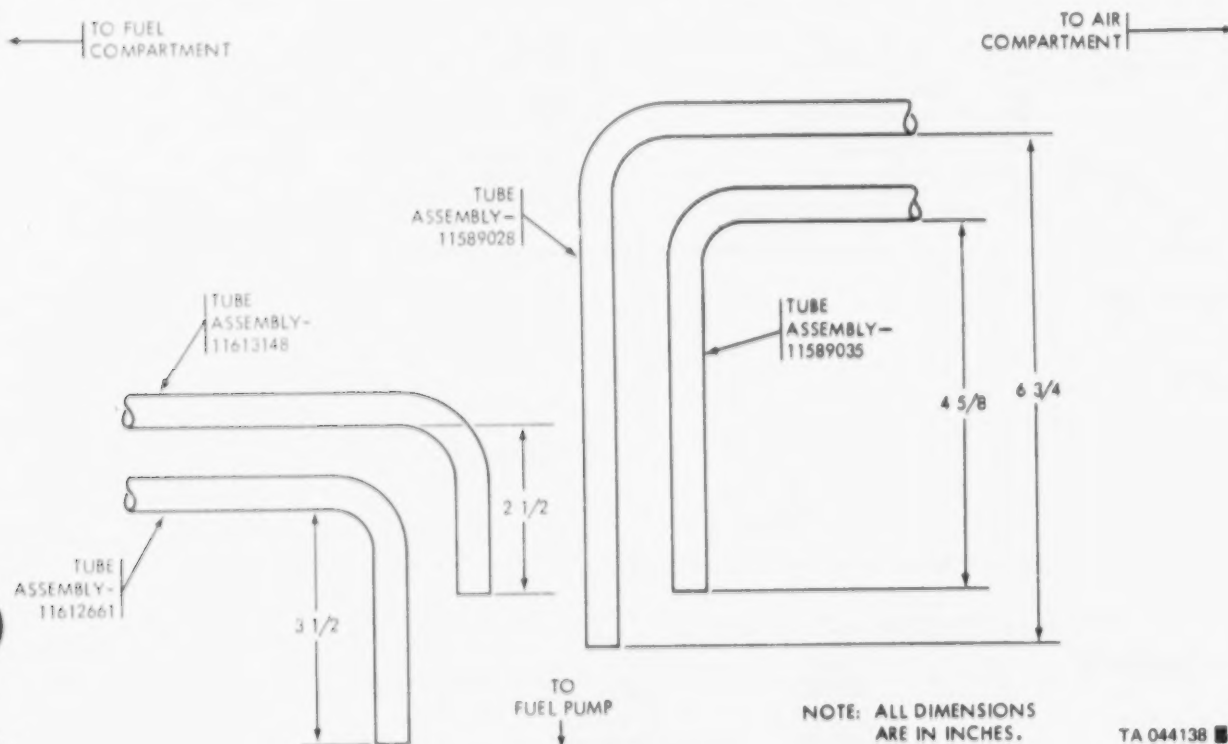


Figure 2-32.1. Cutting off ends of fuel tube assemblies.

(7) Install one connector (10, fig. 2-33.1) on each lead (circuits 77A and 78A). Make up connector from electrical connector kit.

(8) Connect leads and pump leads (78A to right pump, and 77A to left pump).

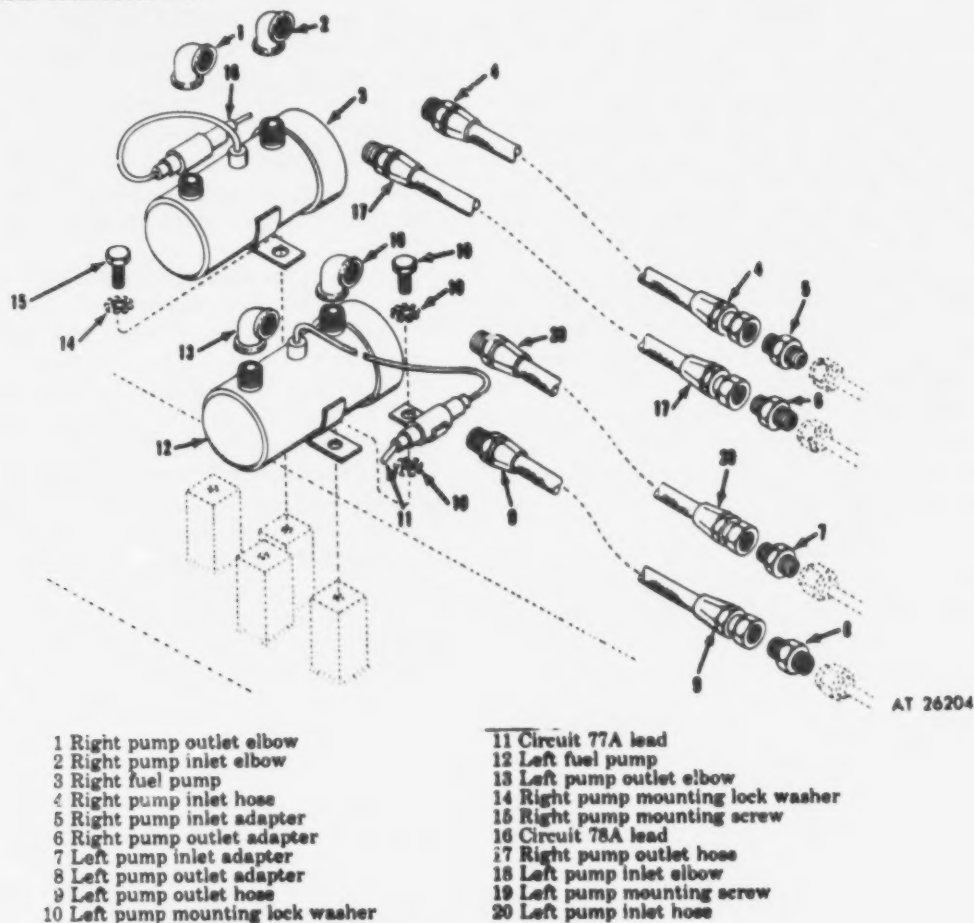
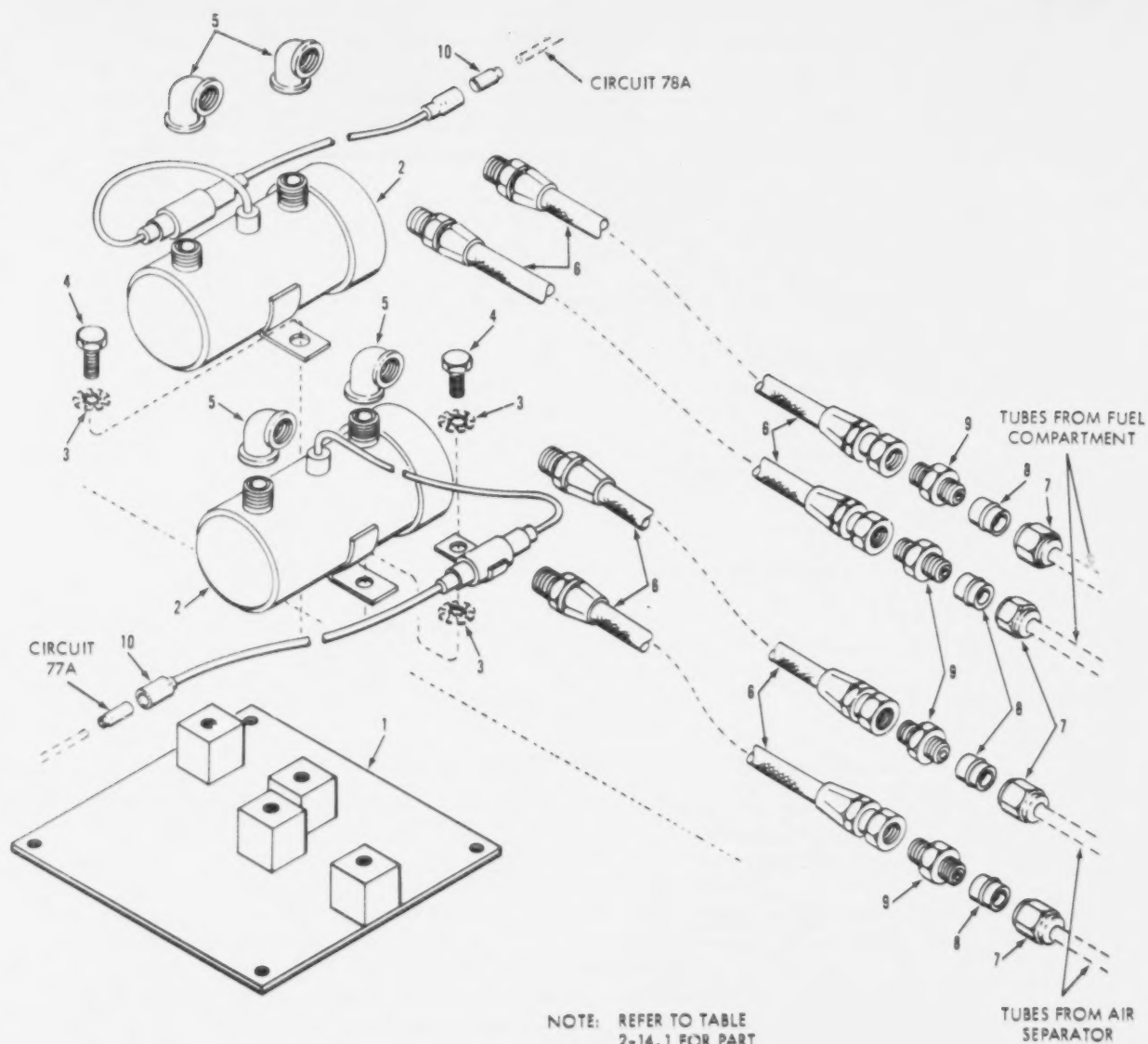


Figure 2-33. Electric fuel pump - carriers after C-307.



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- | | |
|--------------------------|-----------------|
| 1 Adapter mounting plate | 6 Hose assembly |
| 2 Fuel pump | 7 Nut |
| 3 Washer | 8 Sleeve |
| 4 Screw | 9 Adapter |
| 5 Elbow | 10 Connector |

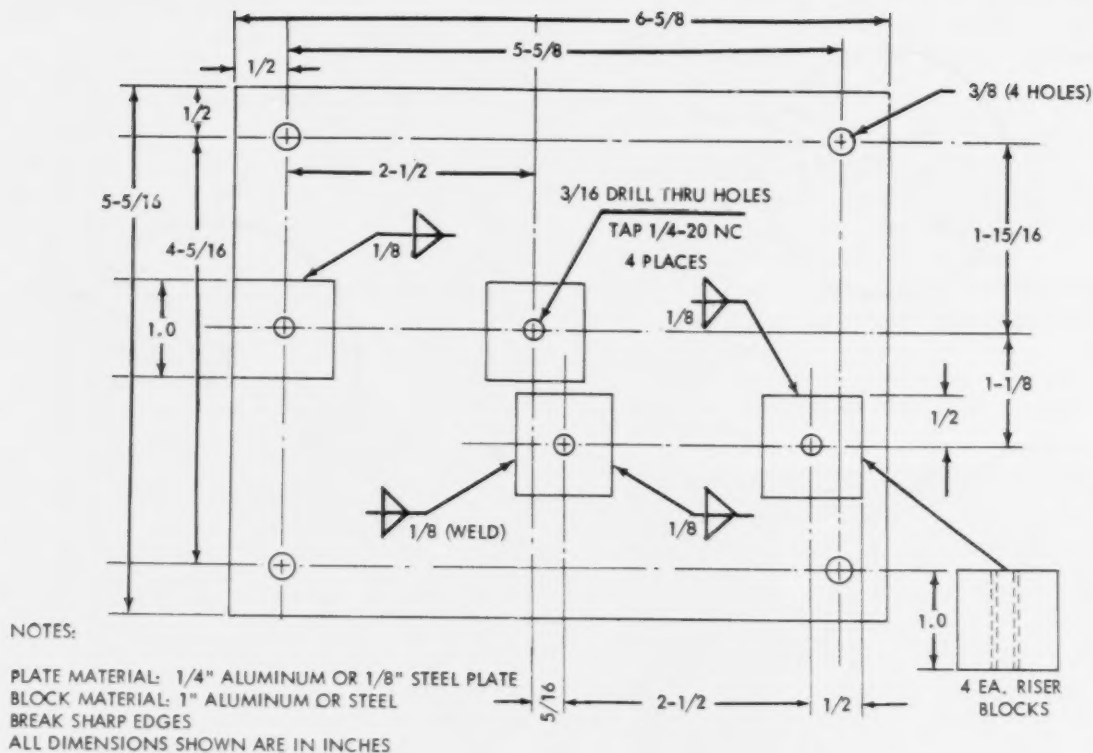
Figure 2-33.1. Replacing nonwaterproof fuel pumps with waterproof electric fuel pumps.

Table 2-14.1. Parts Needed to Replace Nonwaterproof Fuel Pumps with Waterproof Fuel Pumps (fig. 2-33.1)

Item no.	Name	NSN	Part No.	Qty required
1	Adapter mounting plate	2910-00-294-2277	11647555	
2	Fuel pump	2010-00-073-0165	MS51321-2	2
3	Washer	5310-00-067-6357	MS45904-69	6
4	Screw	5305-00-068-0502	MS90725-6	4
5	Elbow	4730-00-766-9892	10932996	4

TM 9-1450-585-20*Table 2-14.1. Parts Needed to Replace Nonwaterproof Fuel Pumps with Waterproof Fuel Pumps (fig. 2-33.1) — continued*

Item no.	Name	NSN	Part No.	Qty required
6	Hose assembly	4720-00-406-7288	10932997-6	4
7	Nut	4730-00-810-4499	MS21921-6	4
8	Sleeve	4730-00-554-7398	MS21922-6	4
9	Adapter	4730-00-541-1578	MS21900-6	4
10	Connector	5935-00-167-7775	MS27144-1	2



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Figure 2-34. Waterproof electric fuel pump adapter mounting plate.

2-50. Electric Fuel Pump Switch

(fig. 2-35)

a. Removal.**NOTE**

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 74 lead (8), circuit 77-78 lead (10), circuit 14A lead (7), and circuit 76 lead (9) at connectors behind instrument panel (26).

(3) Remove two screws (28) and washers (29) securing fuel pump switch (6) and fuel pump switch guard (27) to instrument panel, and remove switch.

b. Inspection and Repair.

(1) Inspect switch for cracks, chips, and broken connectors. Replace switch that shows any of these defects.

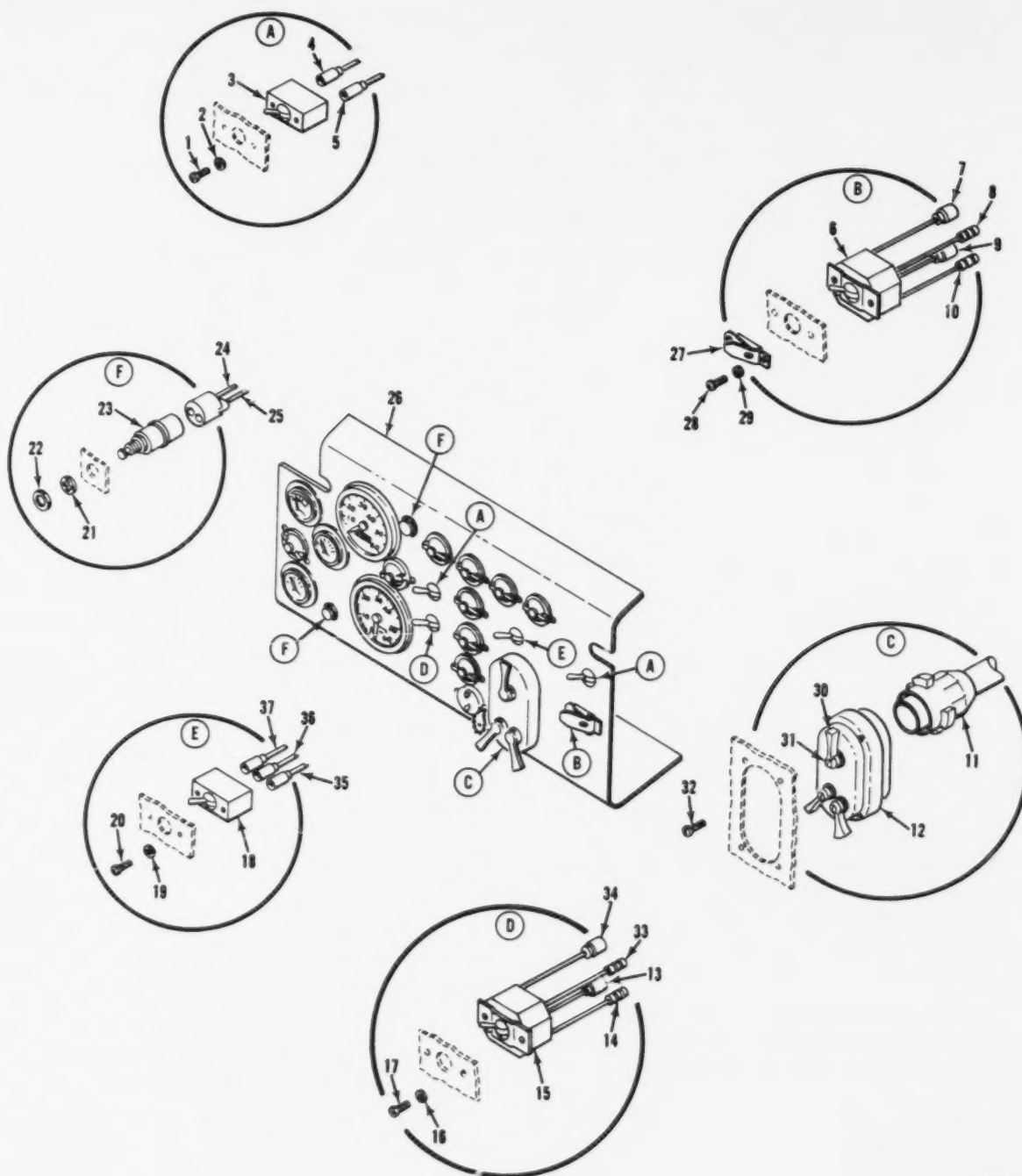
(2) Check switch as described in electrical troubleshooting (para 2-25). Replace switch if defective.

c. Installation.

(1) Position fuel pump switch (6) and fuel pump switch guard (27) on instrument panel (26), and secure with two screws (28) and washers (29).

(2) Connect circuit 76 lead (9), circuit 14A lead (7), circuit 77-78 lead (10), and circuit 74 lead (8) to connectors behind instrument panel.

(3) Install instrument panel (para 2-92).



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Figure 2-35. Instrument panel switches.

Legend to fig. 2-35.

- 1 Switch screw
- 2 Switch washer
- 3 Air box heater or windshield wiper switch
- 4 Circuit lead
- 5 Circuit lead
- 6 Fuel pump switch
- 7 Circuit 14A lead
- 8 Circuit 74 lead
- 9 Circuit 76 lead
- 10 Circuit 77-78 lead
- 11 Selector switch electrical cable connector
- 12 Light selector switch
- 13 Circuit 450B lead
- 14 Circuit 452 lead
- 15 Bilge pump switch
- 16 Bilge pump switch lock washer
- 17 Bilge pump switch screw
- 18 Infrared-blackout selector switch
- 19 B.O. selector switch lock washer
- 20 B.O. selector switch screw
- 21 Horn or starter switch lock washer
- 22 Horn or starter switch hex nut
- 23 Horn or starter switch
- 24 Circuit lead
- 25 Circuit lead
- 26 Instrument panel
- 27 Fuel pump switch guard
- 28 Fuel pump switch screw
- 29 Fuel pump switch washer
- 30 Selector switch knob
- 31 Selector switch knob screw
- 32 Light selector switch screw
- 33 Circuit 451 lead
- 34 Circuit 450 lead
- 35 Circuit 19 lead
- 36 Circuit 520 lead
- 37 Circuit 514-515 lead

2-51. Electric Fuel Pump Circuit Breakers (fig. 2-36)

NOTE

Left and right fuel pump circuit breakers are removed and installed in a similar manner.

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Unlock driver's seat clamp, and swing seat forward to expose battery compartment.
- (2) Raise personnel seat section adjacent to driver's seat, and secure seat in raised position.
- (3) Disconnect battery negative lead (para 2-98).
- (4) Disconnect circuit 77 and 78 leads from left fuel pump circuit breaker on circuit 77A and 78A leads from right fuel pump circuit breaker.
- (5) Remove two screws and nuts securing circuit breaker to bulkhead, and remove circuit breaker. Discard nuts.

b. *Inspection and Repair.* Check electric fuel pump circuit breaker as described in electrical troubleshooting (para 2-25). Replace circuit breaker if defective.

c. Installation.

- (1) Position circuit breaker on bulkhead, and secure with two screws and new nuts.
- (2) Connect circuit 77A and 78A leads to right fuel pump circuit breaker or circuit 77 and 78 leads to left fuel pump circuit breaker.
- (3) Connect battery negative lead (para 2-98).
- (4) Lower personnel seat section adjacent to driver's seat.
- (5) Lower driver's seat over battery compartment and secure seat with clamp.

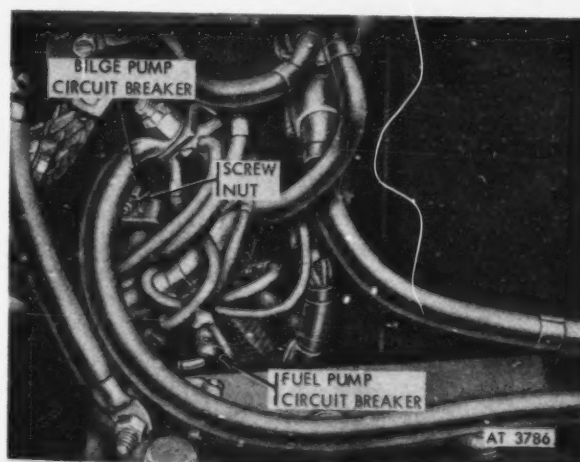


Figure 2-36. Circuit breakers in battery box.

2-52. Fuel Filler Cap (fig. 2-37)

a. Removal.

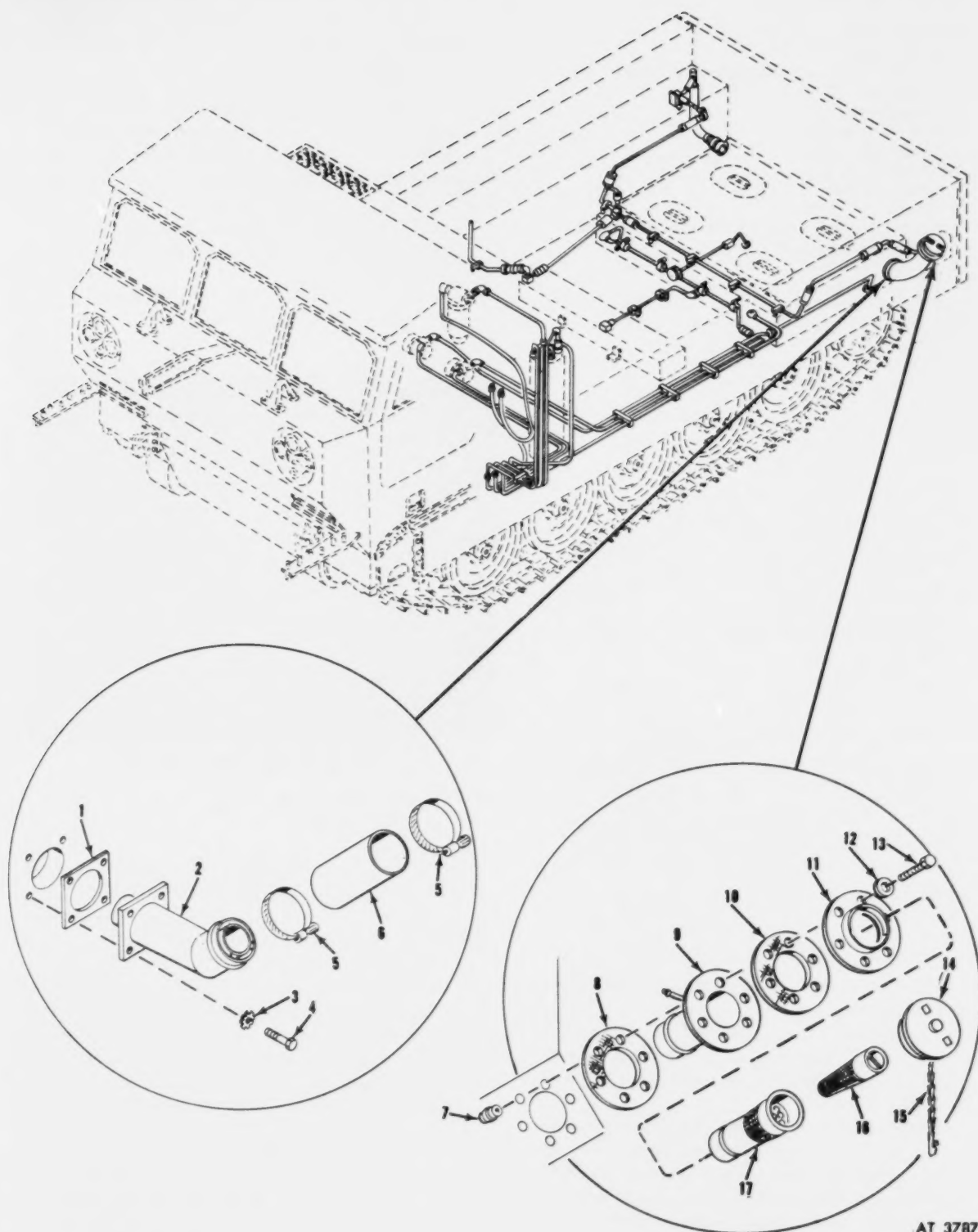
- (1) Turn fuel filler cap (14) counterclockwise to remove from cap attachment flange (11).
- (2) Unfasten cap chain (15) from attachment flange (11), and remove fuel filler cap.

b. Inspection and Repair.

- (1) Inspect fuel filler cap for cracks, deformation, and lack of spring tension in vent. Replace fuel filler cap that shows any one of these defects.
- (2) Pressure test fuel filler cap. Cap must withstand 5 pounds water pressure applied to top of cap. Replace fuel filler cap that fails test.

c. Installation.

- (1) Fasten cap chain (15) to attachment flange (11).
- (2) Turn fuel filler cap (14) clockwise to secure.



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Figure 2-37. Fuel filler cap, screen, and tube.

Legend to fig. 2-37

- 1 Lower filler neck gasket
- 2 Lower filler neck
- 3 Lower filler neck washer
- 4 Lower filler neck screw
- 5 Filler neck hose clamp
- 6 Filler neck hose
- 7 Flange press nut
- 8 Upper filler neck gasket
- 9 Upper filler neck
- 10 Flange gasket
- 11 Cap attachment flange
- 12 Flange washer
- 13 Flange screw
- 14 Fuel filler cap
- 15 Filler cap chain
- 16 Filler tube screen

2-53. Fuel Filler Tube and Screen (fig. 2-37)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Remove fuel filler cap (para 2-52).
- (2) Remove six cap screws (13) and washers (12) from attachment flange (11).
- (3) Remove attachment flange (11), screen (16), filler tube (17), and gasket (10). Discard gasket.
- (4) Remove screen (16) from filler tube.
- (5) Loosen two hose clamps (5) securing hose (6).
- (6) Loosen clamp (7, fig. 2-38), and disconnect vent hose (8) from filler neck.
- (7) Remove filler neck (9, fig. 2-37) and gasket (8). Discard gasket.
- (8) Remove hose (6) and hose clamps (5).
- (9) Remove four screws (4) and internal-external toothed lock washers (3) from lower filler neck (2).
- (10) Remove filler neck (2) and gasket (1) from fuel compartment. Discard gasket.

b. Inspection and Repair.

- (1) Inspect cap attachment flange and lower filler neck for nicks, cracks, and deformation. Replace cap attachment flange or lower filler neck that shows any of these defects.
- (2) Inspect connection hose for deterioration and cracked condition. Replace hose that shows either of these defects.
- (3) Inspect threaded parts for damaged threads and distortion. Replace threaded parts that show either of these defects.

c. Installation.

- (1) Position lower filler neck (2) and new gasket (1) to fuel compartment, and secure with four washers (3) and screws (4).
- (2) Position hose (6) and two clamps (5) on lower filler neck (2).

- (3) Install new gasket (8) and filler neck (9).
- (4) Position hose (6) on upper filler neck (9).
- (5) Connect vent hose (8, fig. 2-38) to filler neck, and tighten hose clamp (7).
- (6) Position screen (16, fig. 2-37) in filler tube (17).
- (7) Install new gasket (10), attachment flange (11), screen (16), and filler tube (17).
- (8) Secure attachment flange (11) with six washers (12) and screws (13).
- (9) Tighten two hose clamps (5).
- (10) Install fuel filler cap (para 2-52).

2-54. Fuel Compartment Tubes, Hoses, and Fittings (fig. 2-38)

NOTE

Before removal and installation of fuel compartment tubes, hoses, and fittings, drain fuel compartment (para 2-62), and remove appropriate fuel compartment/access cover (para 2-59).

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) See figure 2-38 for removal of fuel compartment vent tubes, hoses, and fittings.
- (3) See figures 2-33 and 2-39 for removal of fuel compartment fuel tubes, hoses and fittings.
- (4) See figure 2-40 for removal of expansion tank, tubes, hoses, and fittings.

b. Inspection and Repair.

- (1) Inspect hoses for cracks and deterioration. Replace hoses that show either of these defects.
- (2) Inspect tubes for cracks, crimps, and damaged ends. Replace tubes that show any of these defects.
- (3) Inspect fittings and connections for worn areas and damaged threads. Replace parts that show either of these defects.

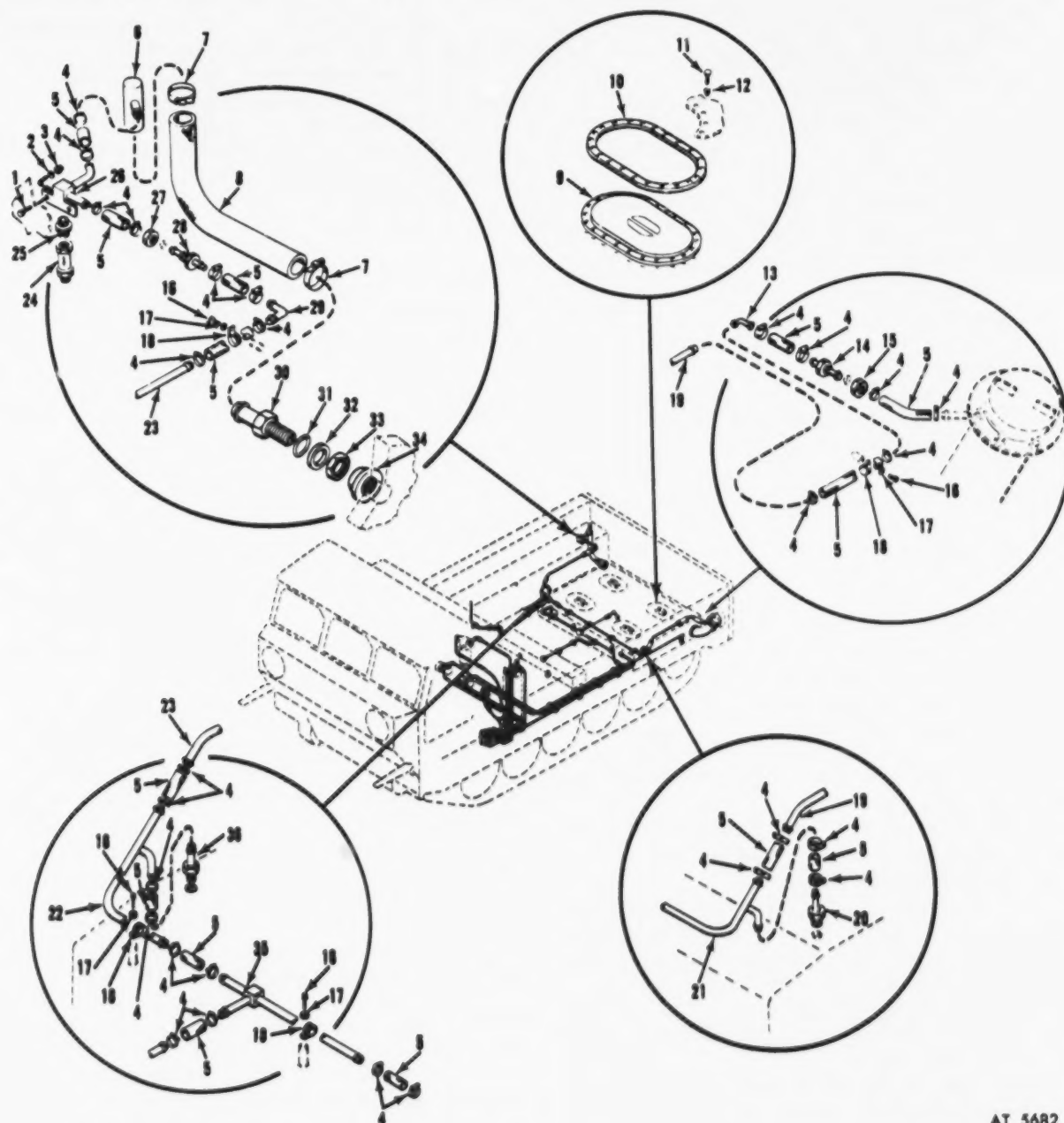
c. Installation.

- (1) Clean tapered pipe fittings, and apply a light coat of sealing compound MIL-S-45180.
- (2) Clean external threads of screws and straight pipe fittings, and apply a light coat of antiseize compound MIL-A-907.
- (3) See figure 2-40 for installation of expansion tank, tubes, hoses, and fittings.
- (4) See figures 2-39 and 2-33 for installation of fuel compartment fuel tubes, hoses, and fittings.
- (5) See figure 2-38 for installation of fuel compartment vent tubes, hoses, and fittings.
- (6) Tighten fuel compartment tube mounting nut (4, fig. 2-39) to 45 to 55 pound-feet torque.

(7) Tighten fuel compartment pickup tube nut(s) (16) to 45 to 55 pound-feet torque.

(8) Tighten fuel expansion tank mounting nuts to 22 to 27 pound-feet torque.

(9) Connect battery negative lead (para 2-98).
d. Test. Start and run engine at 1,200 rpm; and check all connections for fuel leaks.

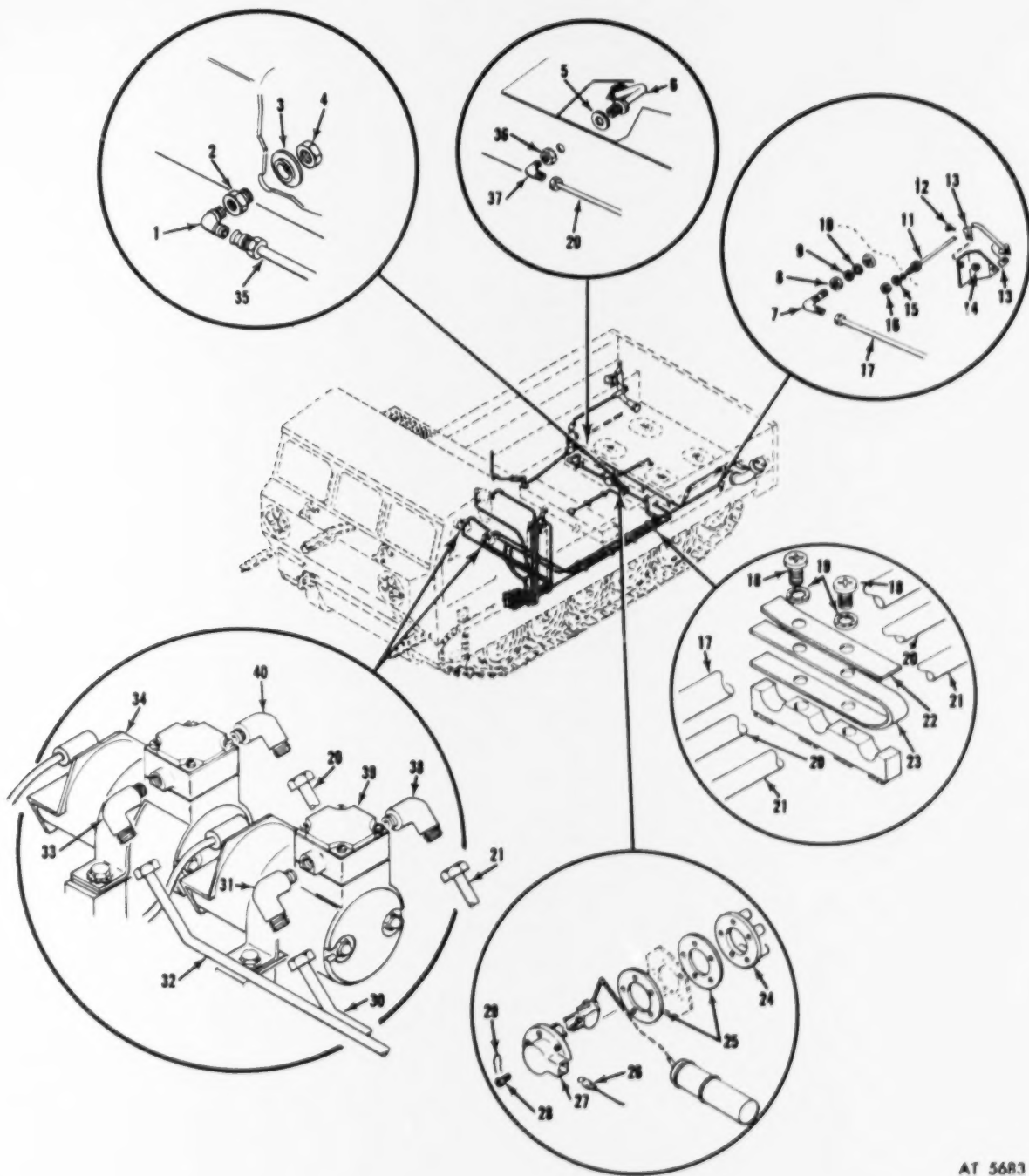


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Figure 2-38. Fuel compartment vent tubes, hoses, and fittings.

Legend to fig. 2-38.

- 1 Vent adapter fitting screw
- 2 Vent adapter fitting washer
- 3 Vent adapter fitting nut
- 4 Vent tube hose clamp
- 5 Vent tube hose
- 6 Vent hose fitting
- 7 Vent hose clamp
- 8 Vent hose
- 9 Fuel compartment access cover
- 10 Access cover gasket
- 11 Access cover screw
- 12 Access cover washer
- 13 Filler vent tube elbow
- 14 Filler vent hose connector
- 15 Filler vent hose connector nut
- 16 Vent tube clamp screw
- 17 Vent tube clamp washer
- 18 Vent tube clamp
- 19 Fuel filler extension vent tube assembly
- 20 Left fuel compartment vent hose nipple
- 21 Left fuel compartment vent tube assembly
- 22 Right fuel compartment vent tube assembly
- 23 Pressure release valve extension vent tube assembly
- 24 Pressure release valve
- 25 Pressure release valve nipple
- 26 Vent adapter fitting
- 27 Vent adapter fitting hose connector nut
- 28 Vent adapter fitting hose connector
- 29 Vent adapter fitting hose elbow
- 30 Fuel vent hose adapter
- 31 Fuel vent hose adapter packing
- 32 Fuel vent hose adapter nut ring
- 33 Fuel vent hose adapter nut
- 34 Fuel vent flange
- 35 Fuel compartment vent tube tee
- 36 Right fuel compartment vent hose nipple

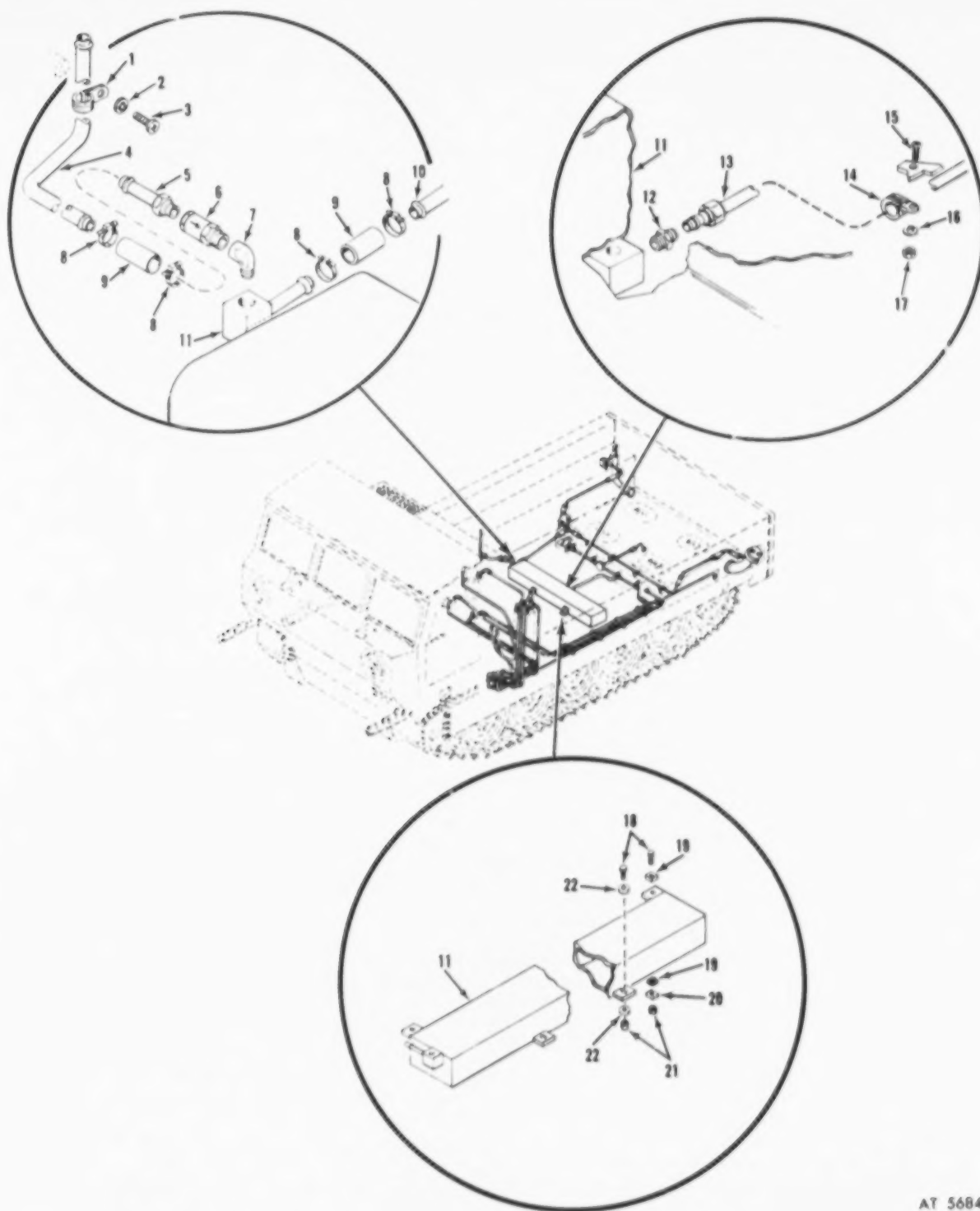


AT 5683

Figure 2-39. Fuel compartment fuel tubes, hoses, and fittings.

Legend to fig. 2-39.

- 1 Fuel compartment expansion tube elbow
- 2 Fuel compartment expansion tube adapter
- 3 Fuel compartment expansion tube washer
- 4 Fuel compartment expansion tube nut
- 5 Right fuel compartment pickup tube washer
- 6 Right fuel compartment pickup tube assembly
- 7 Fuel return line elbow
- 8 Fuel return line nut
- 9 Fuel return line packing retaining ring
- 10 Fuel return line packing
- 11 Left fuel compartment pickup tube
- 12 Pickup tube clamp screw
- 13 Pickup tube clamp
- 14 Pickup tube clamp nut
- 15 Left fuel compartment pickup tube washer
- 16 Left fuel compartment pickup tube nut
- 17 Fuel return line assembly
- 18 Tube retaining strip screw
- 19 Tube retaining strip washer
- 20 Fuel compartment-to-right fuel pump tube assembly
- 21 Fuel compartment-to-left fuel pump tube assembly
- 22 Tube retaining strip
- 23 Tube cushioning rubber strip
- 24 Fuel quantity transmitter bracket
- 25 Fuel quantity transmitter gasket
- 26 Circuit 28 lead assembly
- 27 Fuel quantity transmitter
- 28 Transmitter screw
- 29 Transmitter screw locking wire
- 30 Left fuel pump-to-air separator tank tube assembly
- 31 Left fuel pump outlet elbow
- 32 Right fuel pump-to-air separator tank tube assembly
- 33 Right fuel pump outlet elbow
- 34 Right electric fuel pump assembly
- 35 Fuel compartment-to-expansion tank tube assembly
- 36 Fuel compartment-to-right fuel pump tube nut
- 37 Fuel compartment-to-right fuel pump tube elbow
- 38 Left fuel pump inlet elbow
- 39 Left electric fuel pump assembly
- 40 Right fuel pump inlet elbow



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Figure 2-10. Fuel expansion tank, tubes, hoses, and fittings.

Legend to fig. 2-40.

- 1 Air intake tube clamp
- 2 Air intake tube washer
- 3 Air intake tube screw
- 4 Air intake tube assembly
- 5 Air intake nipple
- 6 Air intake valve
- 7 Air intake elbow
- 8 Tube hose clamp
- 9 Tube hose
- 10 Expansion tank-to-fuel compartment vent tube assembly
- 11 Fuel expansion tank
- 12 Expansion tank nipple
- 13 Fuel compartment-to-expansion tank tube assembly
- 14 Fuel compartment-to-expansion tank tube clamp
- 15 Expansion tank tube clamp screw
- 16 Expansion tank tube clamp washer
- 17 Expansion tank tube clamp nut
- 18 Expansion tank screw
- 19 Expansion tank mounting washer
- 20 Expansion tank shim
- 21 Expansion tank nut
- 22 Expansion tank flat washer

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2-55. Engine Fuel Lines and Fittings

(fig. 2-41 and 2-41.1)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) For removal of engine fuel lines and fittings, see figure 2-41 (early models) or figure 2-41.1 (late models).
- (3) Detach flexible breather hose from valve cover (para 2-39).
- (4) Loosen engine fuel return tube assembly nut (22, fig. 2-41) with wrench 5120-740-3347 (fig. 2-42).

b. Inspection and Repair.

- (1) Inspect hoses for cracks and deterioration. Replace hoses that show either of these defects.
- (2) Inspect fuel return line tube for cracks, crimps, and damaged ends. Replace tube that shows any of these defects.
- (3) Inspect fittings and connections for worn areas and damaged threads. Replace parts that show either of these defects.

c. Installation.

- (1) Clean tapered pipe fittings, and apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426).
- (2) Clean external threads of screws and straight pipe fittings, and apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761).
- (3) See figure 2-41 or 2-41.1 for installation of engine fuel lines and fittings.

NOTE

If an elbow is installed in place of shutoff cock (7, used on early models only) obtain cock from supply, and install in secondary fuel filter.

(4) Tighten engine fuel return tube assembly nut (22, early models, 21, late models) with wrench 5120-740-3347 (fig. 2-42).

(5) Attach flexible breather hose to valve cover (para 2-39).

(6) Connect battery negative lead (para 2-98).

(7) Start and run engine at 1,200 rpm, and check all connections for fuel leaks.

2-56. Primary Fuel Filter

(A, fig. 2-43)

a. Removal.

NOTE

Gasket must be changed each time primary filter element is changed.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Place suitable container under primary fuel filter (31), open drain valve (30), and drain filter. Loosen filter plug (3) enough to allow fuel to flow freely into container.

(3) Disconnect primary filter-to-engine fuel pump hose (29) at top of filter.

(4) Disconnect separator tank-to-primary filter hose (1) from tee (2) at top of filter.

(5) Remove two nuts (10), screws (8), and washers (9) securing primary filter (31) to mounting bracket (5), and remove filter.

(6) If replacement filter is to be installed, remove filter plug (3), plug (4), tee (2), and elbow (28) from defective filter.

b. *Inspection and Repair.* Inspect primary fuel filter for dents, nicks, and cracks that may cause fuel leaks. Replace filter or gasket that shows any of these defects. (See TM 9-2815-205-34P)

c. Installation.

(1) If replacement filter is to be installed, clean two plugs (3 and 4), tee (2), and elbow (28), apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to external tapered threads, and install on replacement filter.

(2) Position primary fuel filter (31) on mounting bracket (5), and secure with two screws (8), washers (9), and nuts (10).

(3) Connect primary filter-to-engine fuel pump hose (29) to elbow (28) at top of filter.

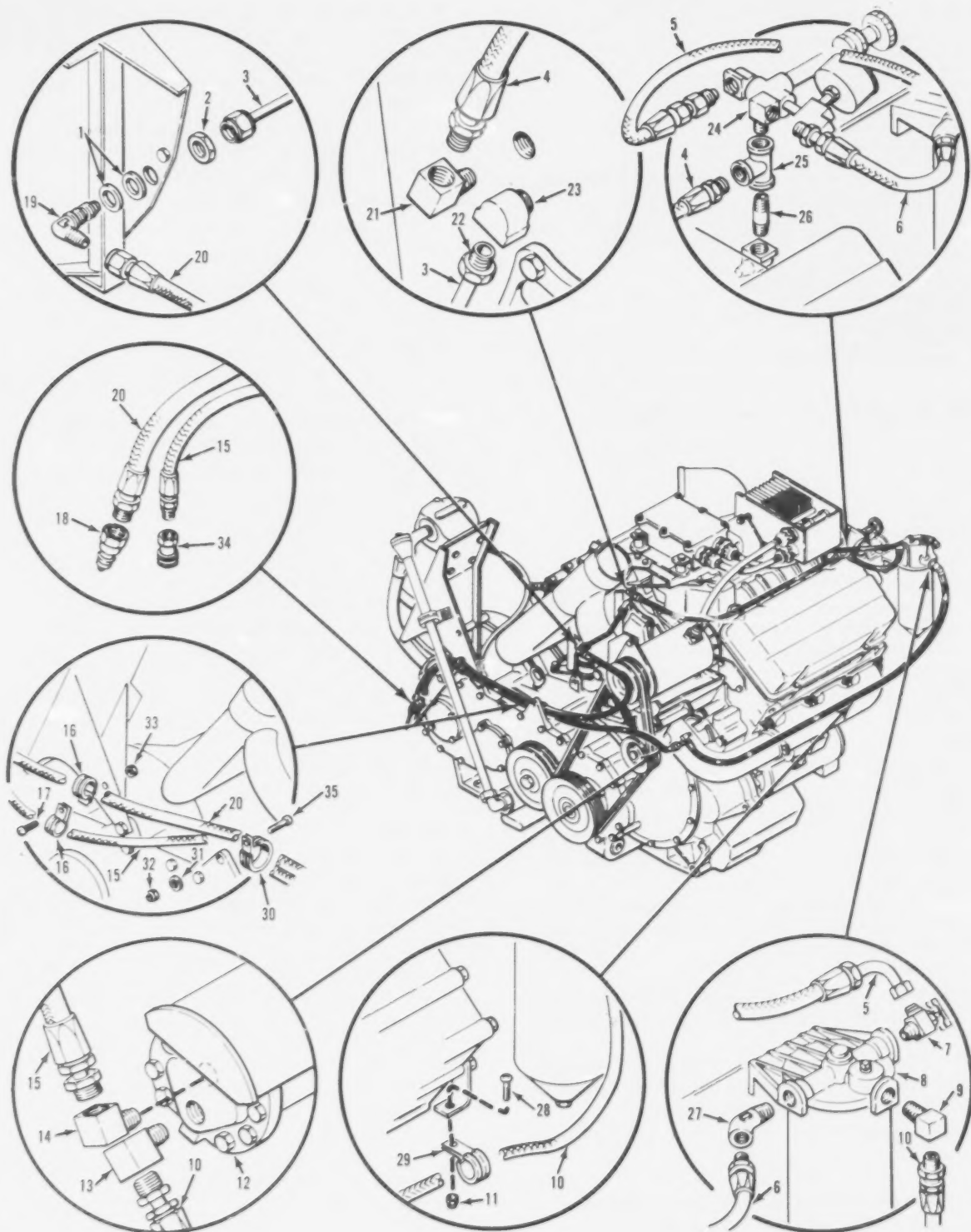
(4) Connect separator tank-to-primary filter hose (1) to tee (2) at top of filter.

(5) Close filter drain valve (30) at bottom of filter.

(6) Remove filter plug (3), and fill filter with clean fuel. Install plug.

(7) Connect battery negative lead (para 2-98).

(8) Start and run engine at 1,200 rpm (TM 9-1450-585-10), and check around connections for fuel leaks.



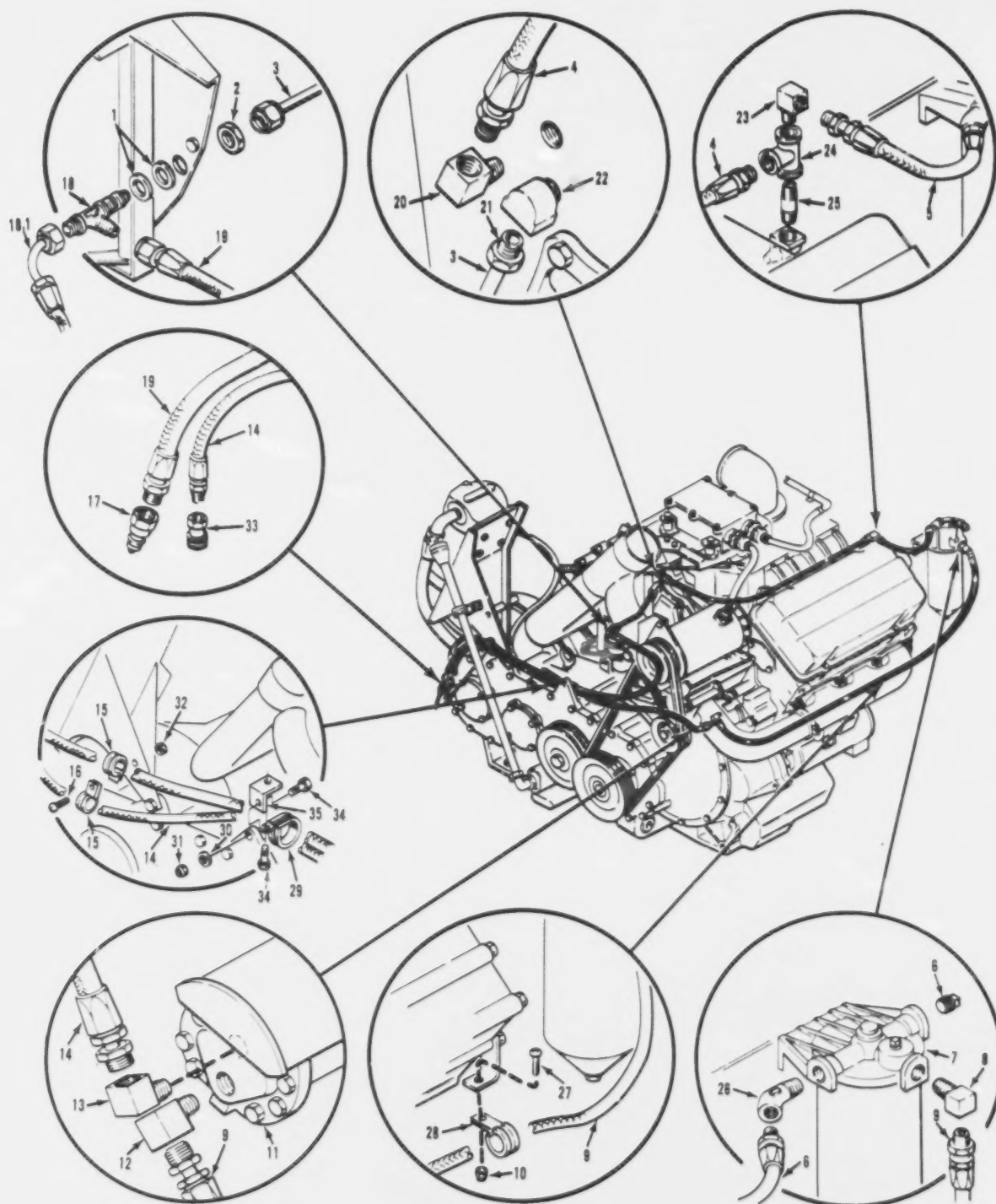
TA 234210

Figure 2-41. Engine fuel lines and fittings (early models).

Legend to fig. 2-41.

- | | |
|---|--|
| 1 Fuel return elbow spacer washer | 19 Fuel return elbow |
| 2 Fuel return elbow nut | 20 Fuel return hose assembly |
| 3 Fuel return tube assembly | 21 Engine block inlet elbow |
| 4 Engine inlet fuel hose assembly | 22 Fuel return tube assembly nut |
| 5 Secondary filter-to-hand pump hose assembly | 23 Engine block outlet elbow |
| 6 Secondary filter-to-engine hose assembly | 24 Secondary filter-to-engine hose elbow |
| 7 Air box heater shutoff cock | 25 Engine block fuel inlet tee |
| 8 Secondary fuel filter assembly | 26 Engine block fuel inlet nipple |
| 9 Secondary filter inlet elbow | 27 Secondary filter 45 degree outlet elbow |
| 10 Engine fuel pump-to-secondary filter hose assembly | 28 Hose clamp screw |
| 11 Hose clamp nut | 29 Hose clamp |
| 12 Engine fuel pump assembly | 30 Hose clamp |
| 13 Engine pump outlet elbow | 31 Hose clamp washer |
| 14 Engine pump inlet elbow | 32 Hose clamp nut |
| 15 Main engine fuel hose assembly | 33 Hose clamp nut |
| 16 Hose clamp | 34 Inlet hose coupling |
| 17 Hose clamp screw | 35 Hose clamp screw |
| 18 Outlet hose coupling | |

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Figure 2-41.1. Engine fuel lines and fittings (late models).

Legend to fig. 2-41.1.

- | | |
|--|--|
| 1 Fuel return elbow spacer washer | 20 Engine block inlet elbow |
| 2 Fuel return elbow nut | 21 Fuel return tube assembly nut |
| 3 Fuel return tube assembly | 22 Engine block outlet elbow |
| 4 Engine inlet fuel hose assembly | 23 Secondary filter-to-engine hose elbow |
| 5 Secondary filter-to-engine hose assembly | 24 Engine block fuel inlet tee |
| 6 Secondary fuel filter plug | 25 Engine block fuel inlet nipple |
| 7 Secondary fuel filter assembly | 26 Secondary filter 45 degree outlet elbow |
| 8 Secondary filter inlet elbow | 27 Hose clamp screw |
| 9 Engine fuel pump-to-secondary filter hose assembly | 28 Hose clamp |
| 10 Hose clamp nut | 29 Hose clamp |
| 11 Engine fuel pump assembly | 30 Hose clamp washer |
| 12 Engine pump outlet elbow | 31 Hose clamp nut |
| 13 Engine pump inlet elbow | 32 Hose clamp nut |
| 14 Main engine fuel hose assembly | 33 Inlet hose coupling |
| 15 Hose clamp | 34 Hose clamp screw |
| 16 Hose clamp screw | 35 Fuel line mounting bracket |
| 17 Outlet hose coupling | |
| 18 Fuel return tee | |
| 18.1 Fuel return hose assembly | |
| 19 Fuel return hose assembly | |

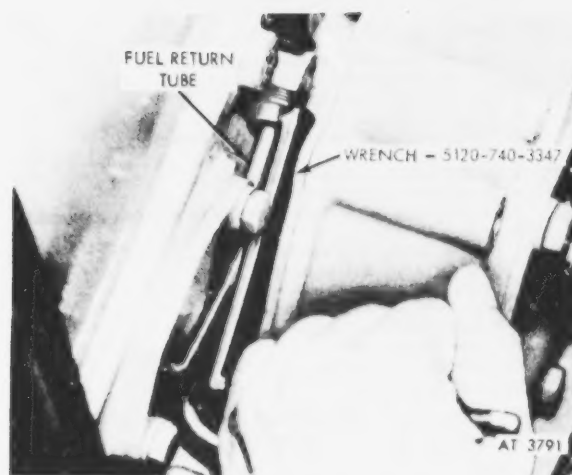
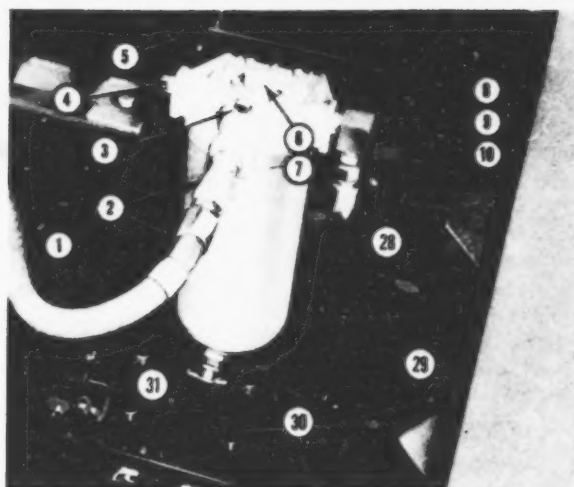
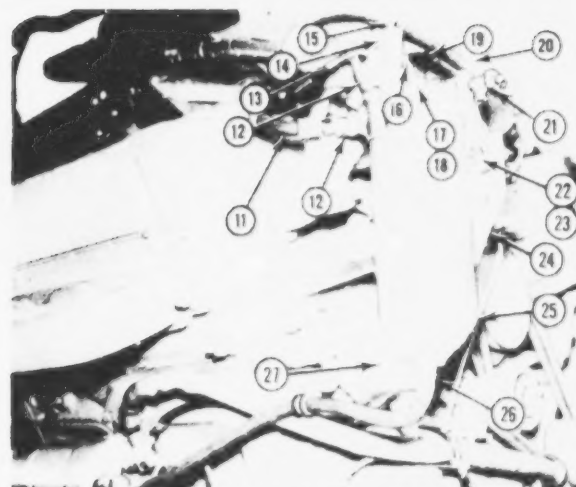


Figure 2-42. Using fuel return line wrench.

DELETED



A-PRIMARY FUEL FILTER



B-SECONDARY FUEL FILTER AND GENERATOR FIELD SWITCH

TA 011965

DELETED

- | | |
|--|---|
| 1 Air separator tank-to-primary filter hose assembly | 17 Secondary filter cover retaining screw |
| 2 Primary filter tee | 18 Secondary filter cover retaining washer |
| 3 Primary filter plug | 19 Circuit 1A lead |
| 4 Primary filter plug | 20 Secondary filter-to-hand pump hose assembly |
| 5 Primary filter mounting bracket | 21 Air box heater fuel shutoff cock |
| 6 Primary filter cover retaining screw | 22 Secondary filter nut |
| 7 Primary filter cover retaining washer | 23 Secondary filter screw |
| 8 Primary filter screw | 24 Secondary filter mounting bracket |
| 9 Primary filter washer | 25 Secondary fuel filter assembly |
| 10 Primary filter nut | 26 Engine fuel pump-to-secondary filter hose assembly |
| 11 Secondary filter-to-engine hose assembly | 27 Secondary filter drain valve |
| 12 Secondary filter elbow | 28 Primary filter outlet elbow |
| 13 Circuit 1B lead | 29 Primary filter-to-engine fuel pump hose assembly |
| 14 Generator field switch tee | 30 Primary filter drain valve |
| 15 Tee plug | 31 Primary fuel filter assembly |
| 16 Generator field switch | |

Figure 2-43. Primary and secondary fuel filters.

2-57. Secondary Fuel Filter

(B, fig. 2-43).

a. Removal.**NOTE**

Gasket must be changed each time secondary filter element is changed.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Place suitable container under secondary fuel filter (25), open drain valve (27), and drain filter. Loosen tee plug (15) enough to allow fuel to flow freely into container.

(3) Remove generator field switch (para 2-137).

(4) Disconnect secondary filter-to-engine hose (11) and secondary filter-to-hand pump hose (20, used only on early models) at top of filter.

(5) Disconnect engine fuel pump-to-secondary filter hose (26) at top of filter.

(6) Remove two nuts (22) and screws (23) securing filter to mounting bracket (24) and remove filter (25).

(7) If replacement filter to be installed, remove three elbows (12) and tee (14) with plug (15) from defective filter.

b. Disassembly (A, fig. 2-44).

(1) Remove cover retaining screw (1) and washer (2) securing fuel filter cover (3) to filter shell (11), and separate cover, cover gasket (6), and filter shell. Discard gasket.

(2) Remove filter element (10), seal retainer (16), seal (15), seal (14), spring retainer (13), and spring (12) from filter shell (11).

(3) Remove drain valve (9) from filter shell (11).

c. Cleaning, Inspection, and Repair.

(1) Clean all parts with clean fuel.

(2) Inspect secondary fuel filter and gasket for dents, nicks, and cracks that may cause fuel leaks. Replace filter or gasket that shows any of these defects. (See TM 9-2815-205-34P)

(3) Inspect spring for distortion and loss of tension. Replace spring that shows either of these defects.

(4) Inspect drain valve for damaged threads, distortion, and improper operation. Replace drain valve that shows any of these defects.

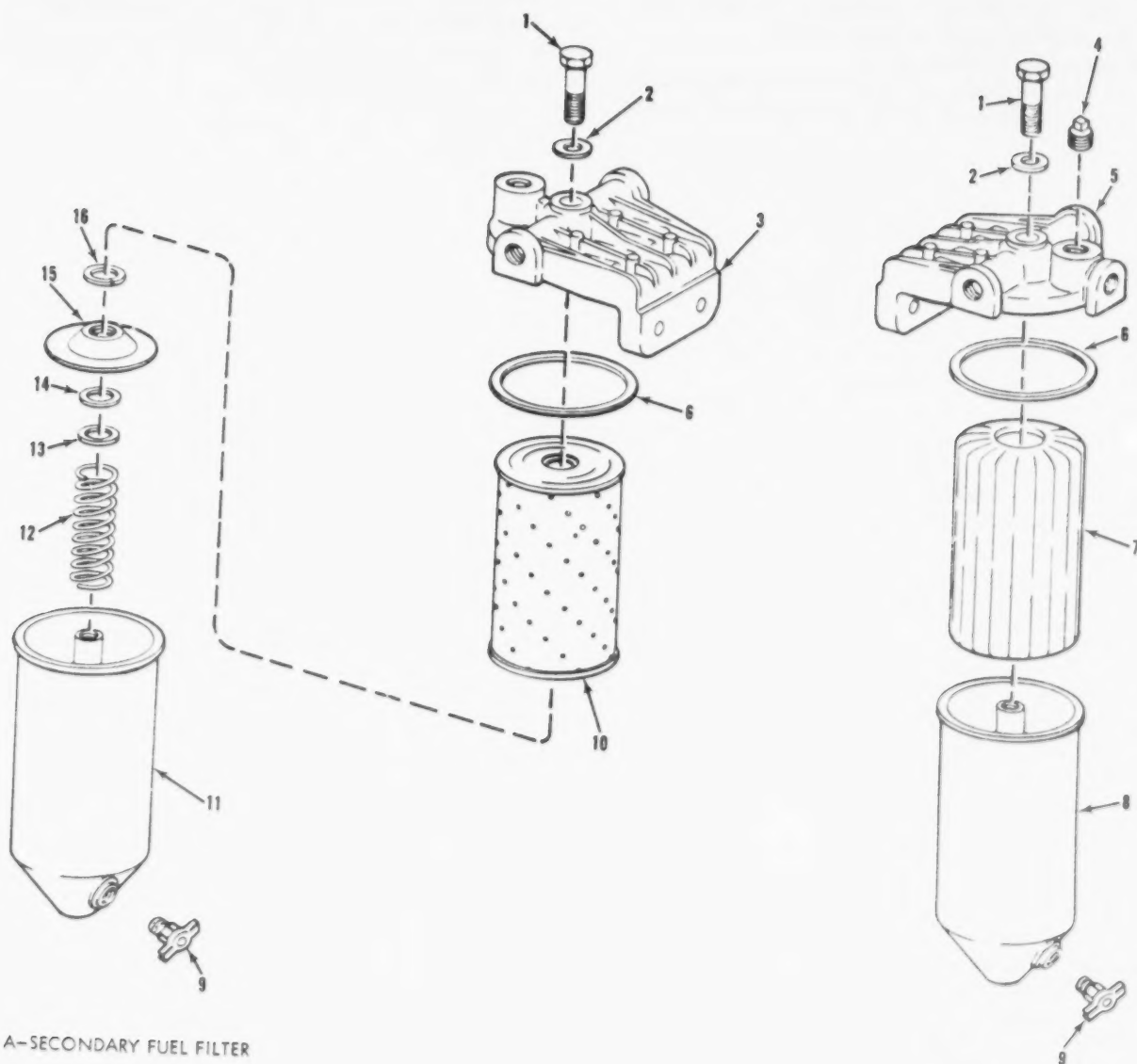
d. Assembly (A, fig. 2-44).

(1) Install drain valve (9) on filter shell (11).

(2) Install fuel filter spring (12), spring

retainer (13), seal (14), seal (15), seal retainer (16), and filter element (10) in filter shell (11).

(3) Position new cover gasket (6) on fuel filter cover (3), position cover on shell (11), and secure with screw (1) and washer (2).



A-SECONDARY FUEL FILTER

B-PRIMARY FUEL FILTER

- 1 Cover retaining screw
- 2 Cover retaining washer
- 3 Secondary filter cover
- 4 Primary filter filler plug
- 5 Primary filter cover
- 6 Cover gasket
- 7 Primary filter element
- 8 Primary filter shell

- 9 Drain valve
- 10 Secondary filter element
- 11 Secondary filter shell
- 12 Filter element spring
- 13 Filter element spring retainer
- 14 Filter element seal
- 15 Filter element seal
- 16 Filter element seal retainer

Figure 2-44. Primary and secondary fuel filters—exploded view.

e. Installation (B, fig. 2-43).

(1) If replacement filter is to be installed, clean tapered pipe threads of two elbows (12), air box heater fuel shutoff cock (21), plug (15), and tee (14), apply a light coat of sealing compound MIL-S-7916 to threads, and install on replacement filter.

NOTE

If an elbow is installed in place of shutoff cock (21, used on early models only) obtain cock from supply, and install in secondary fuel filter.

(2) Position secondary fuel filter (25) on mounting bracket (24), and secure with two screws (23) and nuts (22).

(3) Connect engine fuel pump-to-secondary filter hose (26) to top of filter.

(4) Connect secondary filter-to-engine hose (11) and secondary filter-to-hand pump hose (20, early models only) to top of filter.

(5) Install generator field switch (para 2-137).

(6) Close drain valve (27) at bottom of filter.

(7) Remove tee plug (15), and fill filter with clean fuel. Install plug.

(8) Connect battery negative lead (para 2-98).

(9) Start and run engine at 1,200 rpm (TM 9-1450-585-10), and check around connections for fuel leaks.

2-58. Primary and Secondary Fuel Filter Elements

(fig. 2-44)

NOTE

The elements in the primary and secondary fuel filters are removed and installed in a similar manner.

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Place suitable container under fuel filter, and open drain valve (9) at bottom of shell (8 or 11). Loosen cover filler plug (4) on primary filter or tee plug (15, fig. 2-43) on secondary filter enough to allow fuel to flow freely into container.

(3) Close drain valve (9, fig. 2-44).

(4) Remove cover retaining screw (1) and washer (2) securing primary filter shell (8) or secondary filter shell (11) to primary filter cover (5) or secondary filter cover (3), and remove shell, primary element (7) or secondary element (10), and gasket (6). Discard element(s) and gasket(s).

b. Cleaning, Inspection, and Repair.

(1) Wash shell thoroughly with clean fuel, and blow dry with moisture-free compressed air, or allow to dry at air temperature.

(2) Inspect shell for dents, nicks, and cracks that may cause fuel leaks. Replace fuel filter if shell shows any of these defects.

c. Installation.

(1) Insert new primary filter element (7) or new secondary filter element (10) in primary filter shell (8) or secondary filter shell (11).

(2) Position shell with new gasket (6) to cover (3 or 5), and secure with cover retaining screw (1) and washer (2).

(3) Remove filler plug (4) on primary filter or tee plug (15, fig. 2-43) on secondary filter, and fill fuel filter with clean fuel. Install plug.

(4) Connect battery negative lead (para 2-98).

(5) Start and run engine at 1,200 rpm (TM 9-1450-585-10), and check for leaks around connections and mating surfaces.

2-59. Fuel Compartment Access Cover

(fig. 2-38)

NOTE

The four fuel compartment access covers are removed and installed in a similar manner.

a. Removal

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Drain fuel compartment (para 2-62).

(3) Remove 22 screws (11) and washers (12) securing access cover (9) to top of fuel compartment, and remove cover and gasket (10). Discard gasket.

b. Inspection and Repair. Inspect cover for nicks, cracks, and distortion of mating surface. Replace cover that shows any of these defects.

c. Installation.

NOTE

Make certain mating surfaces of fuel compartment and access cover are clean and free of old gasket.

(1) Install new gasket (10) on access cover (9) with sealing compound MIL-S-8802, and secure with 22 screws (11) and washers (12). Tighten screws to 3 to 4 pound-feet torque.

(2) Fill fuel compartment (TM 9-1450-585-10).

(3) Connect battery negative lead (para 2-98).

2-60. Fuel Quantity Transmitter

(fig. 2-45)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Drain fuel compartment (para 2-62).

(3) Remove right front fuel compartment access cover para 2-59).

(4) Disconnect circuit 28 lead from transmitter (11).

(5) If transmitter has rear support, remove nut (1), washer (2), and clamp (3) securing transmitter (11) to support.

NOTE

It is not necessary to remove screw (8), nut (4), two flat washers (6), two lock washers (5), and grommet (7) to replace transmitter.

(6) Remove locking wire (13) and five screws (12) securing transmitter (11) to fuel compartment, remove transmitter (11) and one gasket (10) from outside compartment. Remove bracket (9) and one gasket (10) from inside compartment. Discard locking wire and gaskets.

b. Inspection and Repair. Check fuel quantity transmitter as described in electrical troubleshooting (para 2-25). Replace transmitter if defective.

c. Installation.

(1) Clean mating surfaces of fuel compartment,

transmitter, and bracket, and apply a light coat of sealing compound MIL-S-8802 to both sides of two new gaskets (10).

(2) Position one gasket (10) and bracket (9) on inside of fuel compartment.

(3) Position one gasket (10) on transmitter (11), thread transmitter through fuel compartment. gasket (10), and bracket (9), and secure with five screws (12) and new locking wire (13).

(4) Connect circuit 28 lead to transmitter (11).

NOTE

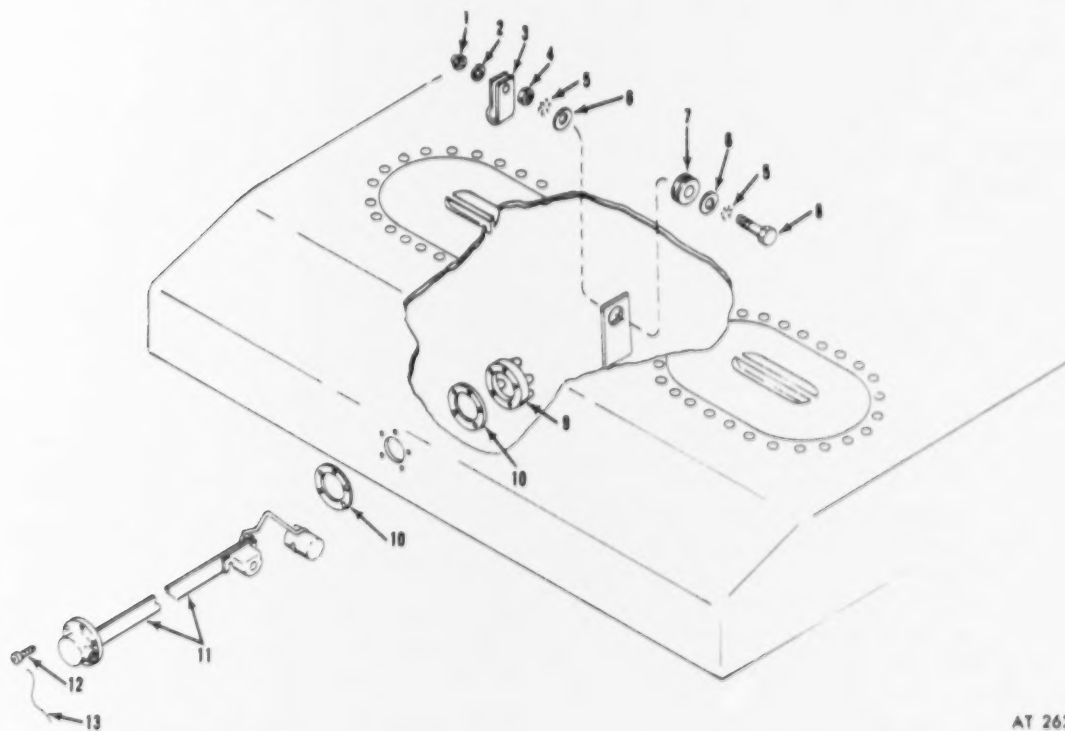
If transmitter has rear support and grommet was removed, install new grommet (7), two new lock washers (5), two flat washers (6), screw (8), and nut (4) in support.

(5) If transmitter has rear support, position clamp (3) on transmitter (11), and secure with washer (2) and nut (1).

(6) Install right fuel compartment access cover (para 2-59).

(7) Fill fuel compartment (TM 9-2450-585-10).

(8) Connect battery negative lead (para 2-98).



AT 26207

- | | | |
|----------------------------------|----------------------------------|------------------------|
| 1. Clamp retaining nut | 6. Grommet retaining flat washer | 10. Transmitter gasket |
| 2. Clamp retaining washer | 7. Grommet | 11. Transmitter |
| 3. Transmitter clamp | 8. Grommet retaining screw | 12. Transmitter screw |
| 4. Grommet retaining nut | 9. Transmitter bracket | 13. Locking wire |
| 5. Grommet retaining lock washer | | |

Figure 2-45. Fuel quantity transmitter.

2-61. Fuel Quantity Indicator (fig. 2-46)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 27A lead (20) and circuit 28 lead (21) from fuel quantity indicator (16).

(3) Remove two nuts (19), washers (18), and clamp (17), and remove indicator (16) from instrument panel (15).

b. Inspection and Repair.

(1) Inspect indicator for cracked or broken

glass and damaged case. Replace indicator that shows any of these defects.

(2) Check indicator as described in electrical troubleshooting (para 2-27). Replace indicator if defective.

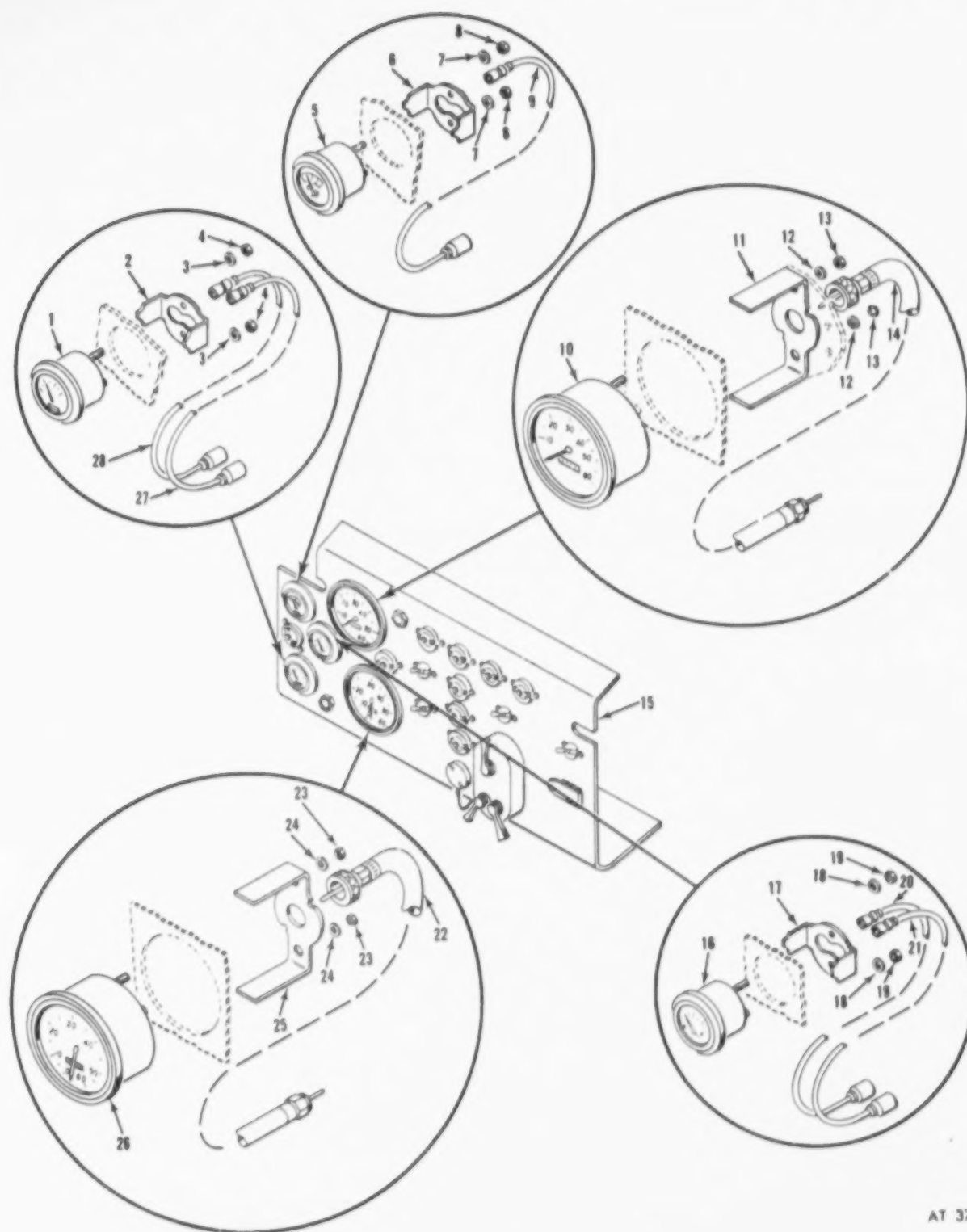
c. Installation.

(1) Position indicator (16) on instrument panel (15), and install clamp (17), two washers (18), and nuts (19).

(2) Connect circuit 28 lead (21) and circuit 27A lead (20) to indicator (16).

(3) Install instrument panel (para 2-92).

(4) Turn master switch ON, and check operation of indicator.



AT 3793

Figure 2-46. Instrument panel indicators.

Legend to fig. 2-46.

- 1 Coolant temperature indicator
- 2 Coolant temperature indicator mounting clamp
- 3 Coolant temperature indicator mounting washer
- 4 Temperature indicator mounting nut
- 5 Battery-generator indicator
- 6 Battery-generator indicator mounting clamp
- 7 Battery-generator indicator mounting washer
- 8 Battery-generator indicator mounting nut
- 9 Circuit 27E lead
- 10 Carrier speedometer
- 11 Speedometer mounting clamp
- 12 Speedometer mounting washer
- 13 Speedometer mounting nut
- 14 Speedometer flexible shaft
- 15 Instrument panel
- 16 Fuel quantity indicator
- 17 Fuel quantity indicator mounting clamp
- 18 Fuel quantity indicator mounting washer
- 19 Fuel quantity indicator mounting nut
- 20 Circuit 27A lead
- 21 Circuit 28 lead
- 22 Tachometer flexible shaft
- 23 Tachometer mounting nut
- 24 Tachometer mounting washer
- 25 Tachometer mounting clamp
- 26 Carrier tachometer
- 27 Circuit 33 lead
- 28 Circuit 27B lead

2-62. Fuel Compartment Drain (fig. 2-47)

NOTE

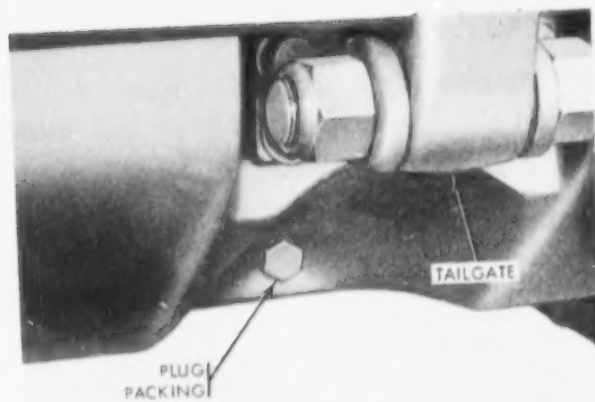
Make certain master switch is OFF.

- a. Disconnect battery negative lead (para 2-98).

WARNING

Fuel flowing over a surface generates static electricity that will result in a spark unless surface is grounded. Provide metallic contact between container and carrier to insure effective ground.

- b. Place clean container of at least 175 gallon capacity under fuel compartment drain.
- c. Remove hexagon head drain plug and packing. Discard packing.
- d. After fuel compartment has been drained, install drain plug with new packing and connect battery negative lead (para 2-98).



AT 3794

Figure 2-47. Fuel compartment drain.

2-63. Accumulator Assembly — Early Models (fig 2-48)

a. Test.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).

(2) Loosen hose (23) to solenoid valve (25) to release fuel pressure in accumulator (4). Tighten hose (23) when pressure indicator (1) indicates no pressure.

(3) Pump several strokes on hand pump assembly (29), and observe reading on pressure indicator (1). Pressure indicator should show rapid pressure rise from zero to maximum precharge pressure, where it will remain without noticeable change for several additional strokes of pump assembly.

(4) If pressure is not within $\frac{1}{4}$ inch of maximum precharge, charge accumulator assembly (b below).

b. Charging.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Loosen hose (23) at solenoid valve (25) to release fuel pressure in accumulator (4). Tighten hose (23) when pressure indicator (1) indicates no pressure.

(3) Install accumulator charging regulator (fig. 2-49) between accumulator and nitrogen bottle.

(4) Close pressure regulator valve by turning T-handle counterclockwise until it turns freely.

(5) Turn nitrogen supply valve counterclockwise until fully open. Nitrogen bottle pressure gage must indicate a minimum of 40 psi. If indication is less than 40 psi, replace nitrogen bottle with fully charged bottle.

(6) Open manifold shutoff valve, and close bleeder valve.

(7) Purge lines by slowly turning pressure regulator valve handle clockwise until gas can be heard escaping from air chuck valve. After 5 to 10 seconds, close manifold shutoff valve.

(8) Remove cap from accumulator charging valve, and install air chuck valve:

(a) Turn T-handle counterclockwise all the way out.

(b) Thread air chuck valve tightly onto charging valve.

(c) Turn T-handle clockwise all the way in.

(9) Slowly open pressure regulator valve until pressure regulator gage indicates 35 psi.

(10) Slowly open manifold shutoff valve.

NOTE

If accumulator indicator shows buildup of pressure, repeat (2) above.

(11) Close nitrogen supply valve when pressure regulator gage stabilizes at original pressure regulator valve setting of 35 psi.

NOTE

Should overcharging occur, close nitrogen supply valve, and bleed off excess pressure with bleeder valve.

(12) Turn T-handle of air chuck valve all the way out.

(13) Open bleeder valve.

(14) Remove accumulator charging regulator (fig. 2-49) from between accumulator and nitrogen bottle.

(15) Reinstall charging valve cap.

(16) Pump several strokes on hand pump assembly (29, fig. 2-48), and observe reading of pressure indicator (1). Pressure indicator should show rapid pressure rise from zero to maximum precharge pressure, where it will remain without

noticeable change for several additional strokes of pump assembly.

(17) If pressure cannot be held to within $\frac{1}{4}$ inch of maximum precharge at pressure indicator (1), replace accumulator (c and e below).

(18) Connect battery negative lead (para 2-98).

(19) Test accumulator assembly (a above), and check for fuel and nitrogen leaks.

c. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Loosen hose (23) at solenoid valve (25) to release fuel pressure in accumulator assembly (4). Tighten hose (23) when pressure indicator (1) indicates no pressure.

(3) Remove two clamps (3) securing accumulator (4) to bracket (34).

(4) Loosen nut (15) on accumulator (4), and disconnect accumulator from inlet tee (11).

(5) Remove two end cushions (2) and one center cushion (6).

d. Inspection and Repair.

(1) Test accumulator assembly precharge pressure (a above). If precharge pressure cannot be maintained as indicated, replace accumulator assembly.

(2) Inspect accumulator assembly for cracks, leaks, and deformation. Replace accumulator assembly that shows any of these defects.

(3) Inspect clamps and cushions for breaks and wear. Replace clamps and cushions that show either of these defects.

e. Installation.

(1) Install two end cushions (2) and one center cushion (6) on accumulator (4), position accumulator bracket (34), and connect nut (15) on accumulator to inlet tee (11).

(2) Position two clamps (3) around accumulator and bracket (34), and secure clamps.

(3) Connect battery negative lead (para 2-98).

(4) Test accumulator assembly (a above), and check for fuel and nitrogen leaks.

2-64. Air Box Heater Ignition Coil — Early Models (fig. 2-48)

a. Removal.

WARNING

The ignition coil output voltage and current are dangerously high. Power supply must be disconnected before maintenance is performed.

NOTE

Place master switch in OFF position.

(1) Disconnect battery negative lead (para

2-98).

(2) Disconnect wiring harness (7) and ignitor cable (26) from ignition coil (5).

WARNING

High voltage. Install cap or tape over open connections.

(3) Remove two clamps (32) securing ignition coil (5) to bracket (34). Remove coil.

b. Inspection and Repair.

(1) Inspect ignition coil for cracks and deformation. Replace ignition coil that shows either of these defects.

(2) Check ignition coil as described in electrical troubleshooting (para 2-24). Replace ignition coil if defective.

(3) Inspect clamps for breaks and excessive wear. Replace clamps that show either of these defects.

c. Installation.

(1) Position ignition coil (5) on bracket (34), and secure with two clamps (32).

(2) Connect wiring harness (7) and ignition cable (26) to coil.

(3) Connect battery negative lead (para 2-98).

2-64.1. Air Box Heater Ignition Coil — Late Models and M730A1 (fig. 2-49.1)

a. Removal.

WARNING

The ignition coil output voltage and current are dangerously high. Power supply must be disconnected before maintenance is performed.

NOTE

Place master switch in OFF position.

(1) Disconnect battery negative lead (para 2-98).

(2) Disconnect ignitor cable (41) and connector (9) from coil (45).

WARNING

High voltage, install cap or tape over open connections.

(3) Remove screw (5), washer (4), and clamp (3) securing coil (45) to mounting bracket (47). Remove coil.

Inspection and Repair.

(1) Inspect ignition coil for cracks and deformation. Replace ignition coil that shows either of these defects.

(2) Check ignition coil as described in electrical troubleshooting (para 2-24). Replace ignition coil if defective.

(3) Inspect clamps for breaks and excessive wear. Replace clamps that show either of these defects.

c. Installation.

(1) Position coil (45) on cushion (46) on mounting bracket (47), and secure with clamp (3), washer (4), and screw (5).

(2) Connect ignitor cable (41) and connector (9) to coil (45).

(3) Connect battery negative lead (para 2-98).

2-65. Accumulator Pressure Indicator — Early Models

(fig. 2-48)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Loosen hose (23) at solenoid valve (25) to release fuel pressure in accumulator (4). Tighten hose (23) when pressure indicator (1) indicates no pressure.

(3) Remove pressure indicator (1) from nipple (9) on accumulator inlet tee (11).

b. Inspection and Repair. Inspect pressure indicator for broken or cracked glass and deformation of case. Replace pressure indicator that shows any of these defects.

c. Installation.

(1) Install pressure indicator (1) on nipple (9) between indicator and inlet tee (11).

(2) Charge fuel system in accumulator assembly (para 2-63), and check for fuel and nitrogen leaks.

(3) Connect battery negative lead (para 2-99).

2-66. Air Box Heater Hand Pump Assembly — Early Models

a. Removal (fig. 2-48).

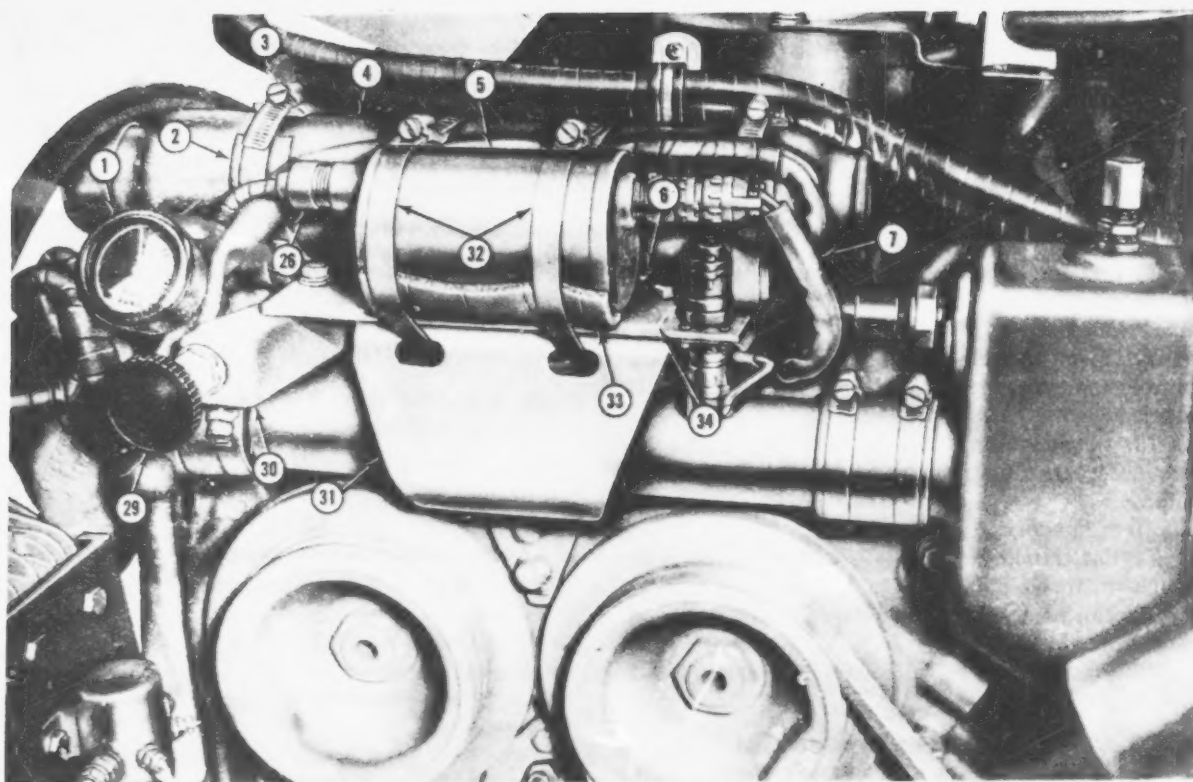
NOTE

Make certain master switch is OFF.

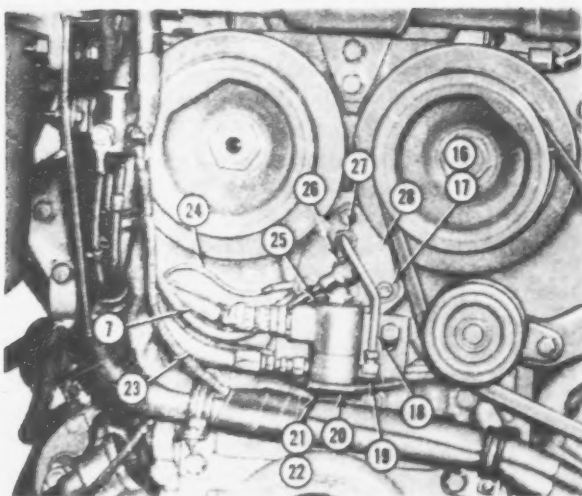
(1) Disconnect battery negative lead (para 2-98).

(2) Loosen hose (23) at solenoid valve (25) to release fuel pressure in accumulator (4). Tighten hose (23) when pressure indicator (1) indicates no pressure.

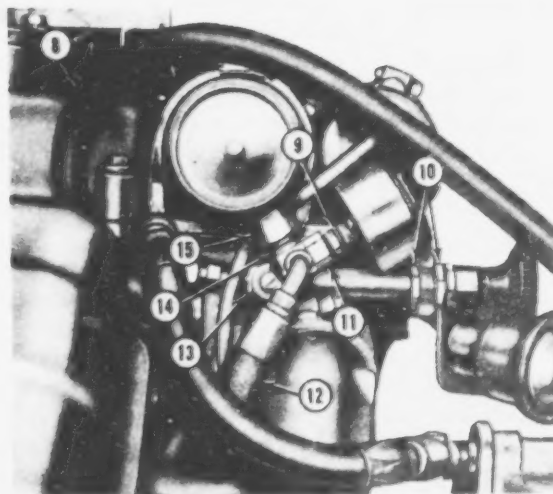
(3) Loosen nut (15) on accumulator (4) connecting inlet tee (11) to accumulator.



A-AIR BOX HEATER ACCUMULATOR, COIL, PRESSURE INDICATOR, PUMP, AND WIRING HARNESSES



B-AIR BOX HEATER SOLENOID VALVE, TUBE ASSEMBLY, AND (OPTION) OR AND NOZZLE



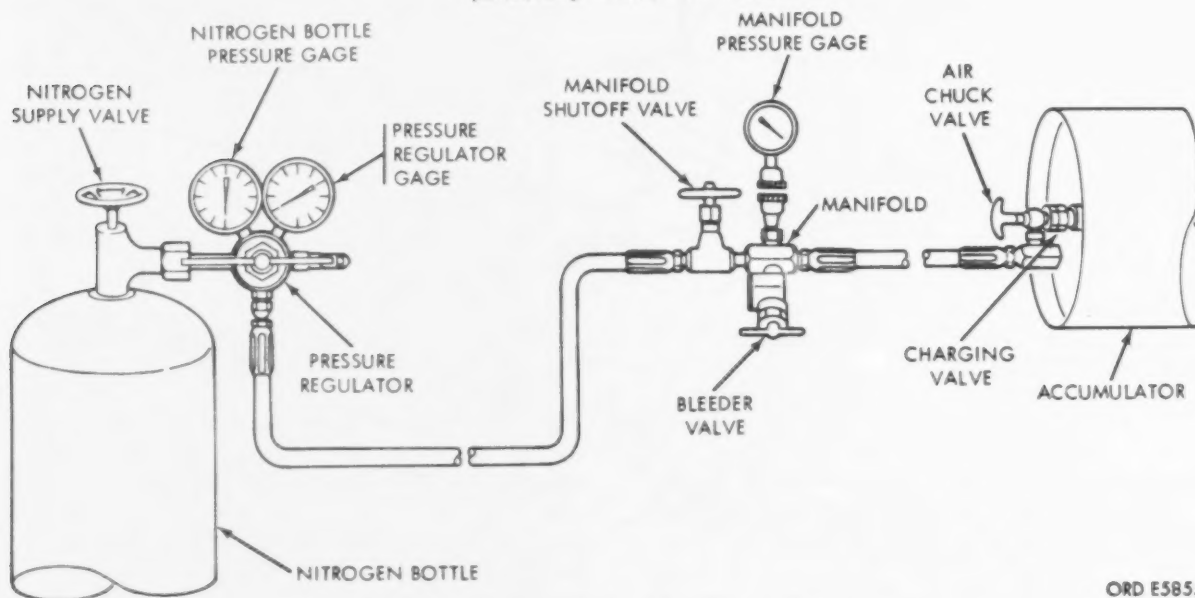
C-AIR BOX HEATER PUMP, HOSE ASSEMBLIES, AND FITTINGS
AT 3795

Figure 2-48. Air box heater accumulator, coil, solenoid valve, and related parts (early models).

Legend to fig. 2-48.

- | | |
|--|---|
| 1 Pressure indicator | 18 Solenoid valve-to-ignitor and nozzle tube assembly |
| 2 Accumulator end cushion | 19 Solenoid valve tube assembly elbow |
| 3 Accumulator clamp | 20 Solenoid valve bracket |
| 4 Accumulator assembly | 21 Solenoid valve bracket machine screw |
| 5 Ignition coil | 22 Solenoid valve bracket lock washer |
| 6 Accumulator center cushion | 23 Solenoid valve hose assembly |
| 7 Solenoid valve-to-coil wiring harness | 24 Ground lead |
| 8 Hand pump hose assembly | 25 Solenoid valve |
| 9 Pressure indicator nipple | 26 Ignitor and nozzle-to-coil electrical lead |
| 10 Hand pump locknut | 27 Tube assembly nut |
| 11 Accumulator inlet tee | 28 Air box heater |
| 12 Inlet tee-to-solenoid valve hose assembly | 29 Hand pump |
| 13 Inlet tee elbow | 30 Hand pump bracket |
| 14 Inlet tee nipple | 31 Accumulator and coil bracket |
| 15 Accumulator nut | 32 Coil clamp |
| 16 Ignitor and nozzle cap screw | 33 Coil cushion |
| 17 Ignitor and nozzle washer | 34 Accumulator and coil mounting bracket |

Figure 2-48. Air box accumulator coil, solenoid valve, and related parts (early models) - continued.



ORD E58556

Figure 2-49. Accumulator charging equipment (early models).

(4) Disconnect accumulator to solenoid valve hose assembly (23) at inlet tee (11).

(5) Disconnect fuel inlet hose (8) from inlet elbow (13) on pump assembly (29).

(6) Loosen locknuts (10) securing pump assembly (29) to bracket (30), and remove pump assembly (29), with pressure indicator (1) attached from bracket (30).

(7) Separate nipple (14), tee (11), nipple (9), and pressure indicator (1) from pump assembly (29).

(8) Remove inlet elbow (13) from pump assembly (29).

b. Inspection and Repair. Inspect pump assembly for cracks, deformation, and leaks. Repair pump assembly that shows any of these defects (c through e below).

c. Disassembly (fig. 2-50).

(1) Remove locknut (3) from pump body (12).

Remove piston rod (2) and attached parts from body as an assembly.

(2) Remove piston (7), needle valve (6), spring (5), spring seat (4), and locknut (3) from piston rod (2).

NOTE

Piston (7) is threaded onto end of piston rod (20).

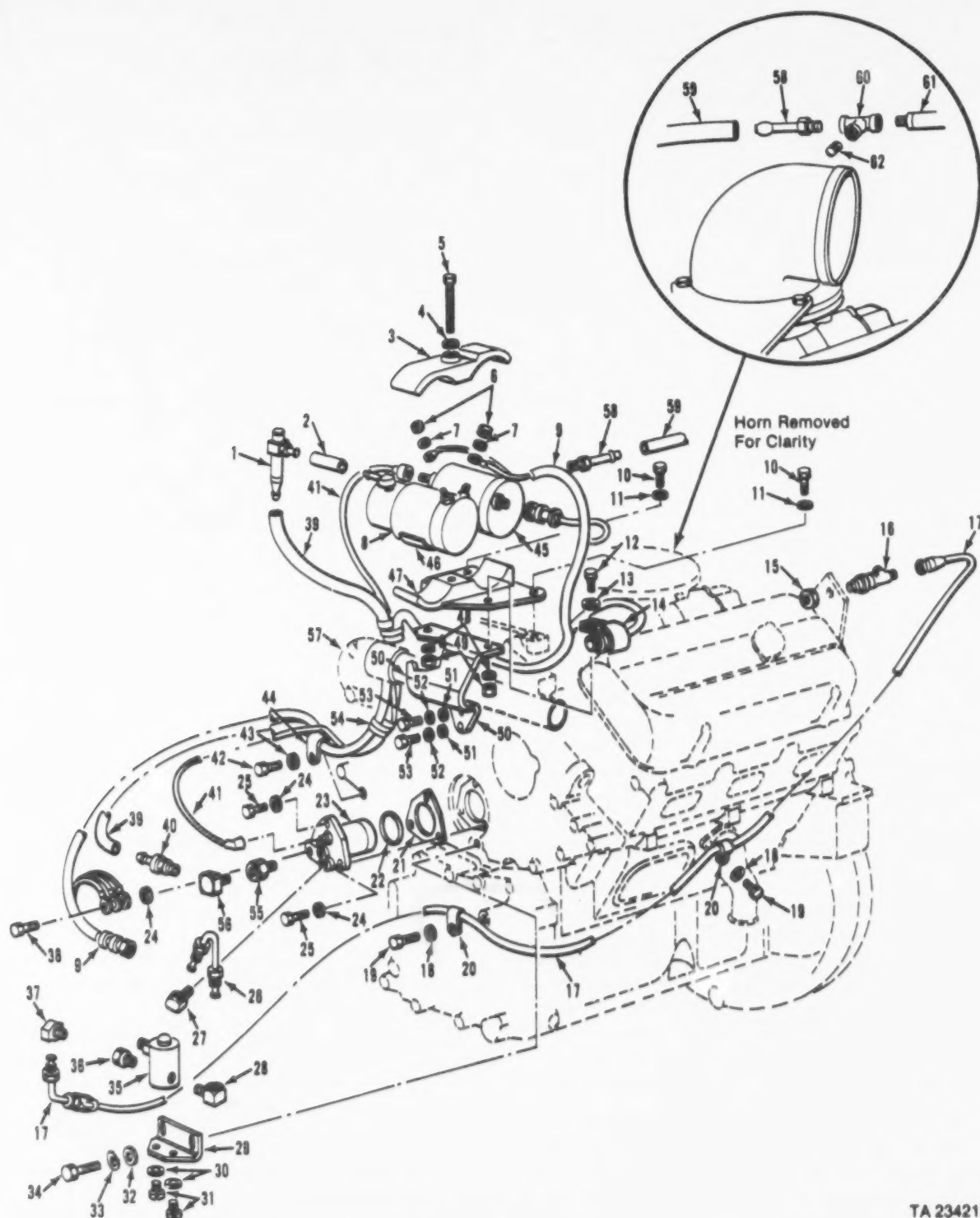
(3) Remove pin (17) and remove knob (1) from piston rod (2). Remove lock pin (16) from piston rod (2).

NOTE

Remove knob (1) and lock pin (16) only when inspection indicates damage.

(4) Remove and discard two preformed packings (8) from piston (7).

(5) Remove locknut (13), locknut (15), and flat washer (14) from pump body (12).



TA 234212

Figure 2-49.1. Engine air box heater with electric pumps, hoses, and fittings (late models and M730A1) — exploded view.

Legend for fig. 2-49.1

- 1 Air pump check valve
- 2 Check valve outlet hose
- 3 Pump and coil clamp
- 4 Pump and coil clamp washer
- 5 Pump and coil clamp screw
- 6 Pump terminal nut (2)
- 7 Pump terminal washer (2)
- 8 Air pump
- 9 Wiring harness
- 10 Pump and coil bracket screw (2)
- 11 Pump and coil bracket washer (2)
- 12 Pump and coil bracket short screw (2)
- 13 Pump and coil bracket washer (2)
- 14 Electrical lead clip
- 15 Fuel tee fitting nut
- 16 Fuel tee fitting
- 17 Fuel hose
- 18 Hose clamp washer (2)
- 19 Hose clamp screw (2)
- 20 Fuel hose clamp (2)
- 21 Air box heater gasket
- 22 Air box heater preformed packing
- 23 Air box heater
- 24 Heater copper washer (2)
- 25 Heater screw (2)
- 26 Fuel tube
- 27 Tube elbow
- 28 Tube elbow
- 29 Solenoid valve bracket
- 30 Solenoid valve washer (2)
- 31 Solenoid valve screw (2)
- 32 Solenoid valve bracket flat washer (2)

- 33 Solenoid valve bracket lock washer (2)
- 34 Solenoid valve bracket screw (2)
- 35 Solenoid valve
- 36 Fuel hose adapter (2)
- 37 Solenoid valve elbow (2)
- 38 Harness ground lead screw
- 39 Heater hose
- 40 Heater hose fitting
- 41 Ignitor cable
- 42 Hose clamp screw
- 43 Hose clamp washer
- 44 Heater hose clamp
- 45 Air box heater ignition coil
- 46 Pump or coil cushion (2)
- 47 Pump and coil bracket
- 48 Pump and coil bracket lock washer (2)
- 49 Pump and coil bracket nut (2)
- 50 Pump and coil bracket support
- 51 Bracket support flat washer (2)
- 52 Bracket support lock washer (2)
- 53 Bracket support screw (2)
- 54 Heater hose spiral tubing (2)
- 55 Fuel hose adapter
- 56 Tube elbow
- 57 Engine
- 58 Air hose adapter (2)
- 59 Air hose
- 60 Air hose and restriction indicator hose tee
- 61 Air restriction indicator hose
- 62 Air hose and restriction indicator hose tee nipple

(6) Remove two retainer screws (11), check ball springs (10), and check balls (9) from pump body (12).

d. Cleaning, Inspection, and Repair.

(1) *Cleaning.* Clean pump assembly components with dry cleaning solvent or mineral spirits thinner.

(2) *Inspection.* Inspect hand pump for bent piston rod, dented or broken pump body, pitted check valve ball, and worn or corroded piston and needle valve. Check knob and lock pin on piston rod for cracks and excessive wear.

(3) *Repair.* Replace all defective parts (including all preformed packings).

e. Assembly (fig. 2-50).

(1) Install two check balls (9) and check ball springs (10) in pump body (12), and secure in place with two retainer screws (11).

(2) Install locknut (13), flat washer (14), and locknut (15) on pump body (12). Thread locknuts on body approximately 1 inch.

(3) Install knob (1) on piston rod (2), and secure in place with pin (17).

(4) Lubricate two new preformed packings (8) lightly with engine oil (OE-10), and install on piston (7).

(5) Install piston rod (2) into locknut (3).

(6) Install needle valve (6), spring (5), and spring seat (4) into piston (7).

(7) Install piston rod (2) into piston (7).

(8) Install piston and rod assembly, assembled in (7) above, into pump body (12), and secure in place with locknut (3).

f. Installation (fig. 2-48).

(1) Install nipple (14), tee (11), nipple (9), and pressure indicator (1) on pump assembly (29).

(2) Install inlet elbow (13) in pump assembly (29).

(3) Connect fuel hose (8) to pump inlet elbow (13).

(4) Position pump assembly (29) in slot in bracket (30).

(5) Position nut (15) on tee (11), and tighten nut to secure tee to accumulator (4).

(6) Tighten two locknuts (10) on pump assembly (29) to secure pump to bracket (30).

(7) Connect accumulator to solenoid valve hose assembly (23) at tee (11).

(8) Charge fuel system in accumulator assembly (para 2-63), and check for fuel and nitrogen leaks.

(9) Connect battery negative lead (para 2-98).

2-66.1. Air Pump — Late Models and M730A1 (fig. 2-49.1)

a. Removal.

(1) Place master switch in OFF position.

- (2) Disconnect battery negative lead (para 2-98).
- (3) Remove hose (2) from air pump (8).
- (4) Remove air hose (59) and adapter (58) from air pump (8).

(5) Remove two nuts (6), washers (7), and leads (9) from pump (8).

(6) Remove screw (5), washer (4), and clamp (3), and remove pump (8).

b. Cleaning, Inspection, and Repair.

(1) Clean outside of air pump assembly with dry cleaning solvent. Do not submerge.

(2) Inspect pump for cracks, dents, and general damage.

(3) Check operation of pump as described in troubleshooting (paras 2-16 and 2-17). Replace pump if defective.

c. Installation.

(1) Position pump on bracket (47) and pad (46). Secure in place with clamp (3), washer (4), and screw (5).

(2) Place leads (9) on terminals on pump (8), and secure with washers (7) and nuts (6).

(3) Connect hose (2) to pump (8).

(4) Connect hose (59) and adapter (58) to air pump (8).

(5) Connect battery negative lead (para 2-98).

2-66.2. Air Pump Vane Kit — Late Models and M730A1 (fig. 2-49.2)

NOTE

If you are experiencing numerous air pump failures, it is recommended that you install new vane kit 2540-01-105-3037. The vanes on this new improved kit are made of carbon and teflon for longer life.

a. Removal. Remove air pump from engine (para 2-66.1).

b. Kit installation.

(1) Remove three machine screws (1) from pump end cover (3).

(2) Remove cover plate (3).

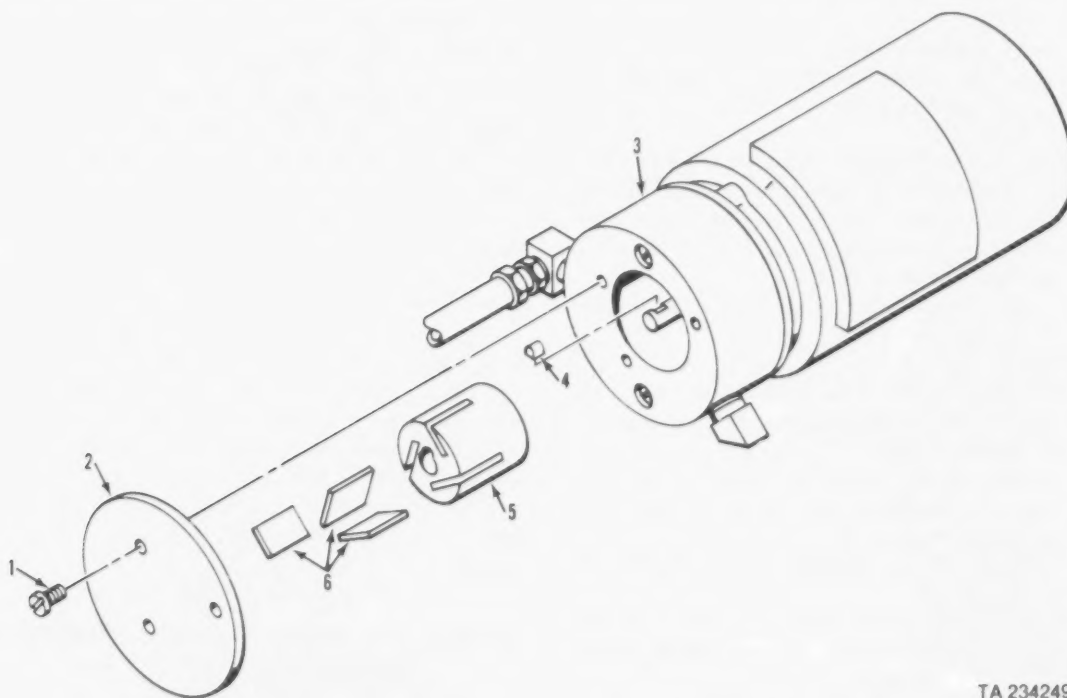
(3) Remove old three piece vane set (6), eccentric hub (5), and key (4).

(4) Clean pump cavity of carbon dust.

(5) Install eccentric hub (5) and key (4) in pump cavity.

(6) Install new vane set (6) into slots of eccentric hub (5).

(7) Install pump cover plate (3) and secure with screws (1).



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Figure 2-49.2. Air pump vane kit.

Legend to fig. 2-49.2.

- | | |
|---------------|-----------------|
| 1 Screw | 4 Key |
| 2 Cover plate | 5 Eccentric hub |
| 3 End cover | 6 Vane set |

CAUTION

Engine starter must be engaged before operating air pump. Damage to air pump vanes may result if engine starter is not engaged.

c. *Test.* Use a 12 volt dc power source to check air pump operation.

d. *Installation.* Install air pump on engine (para 2-66.1).

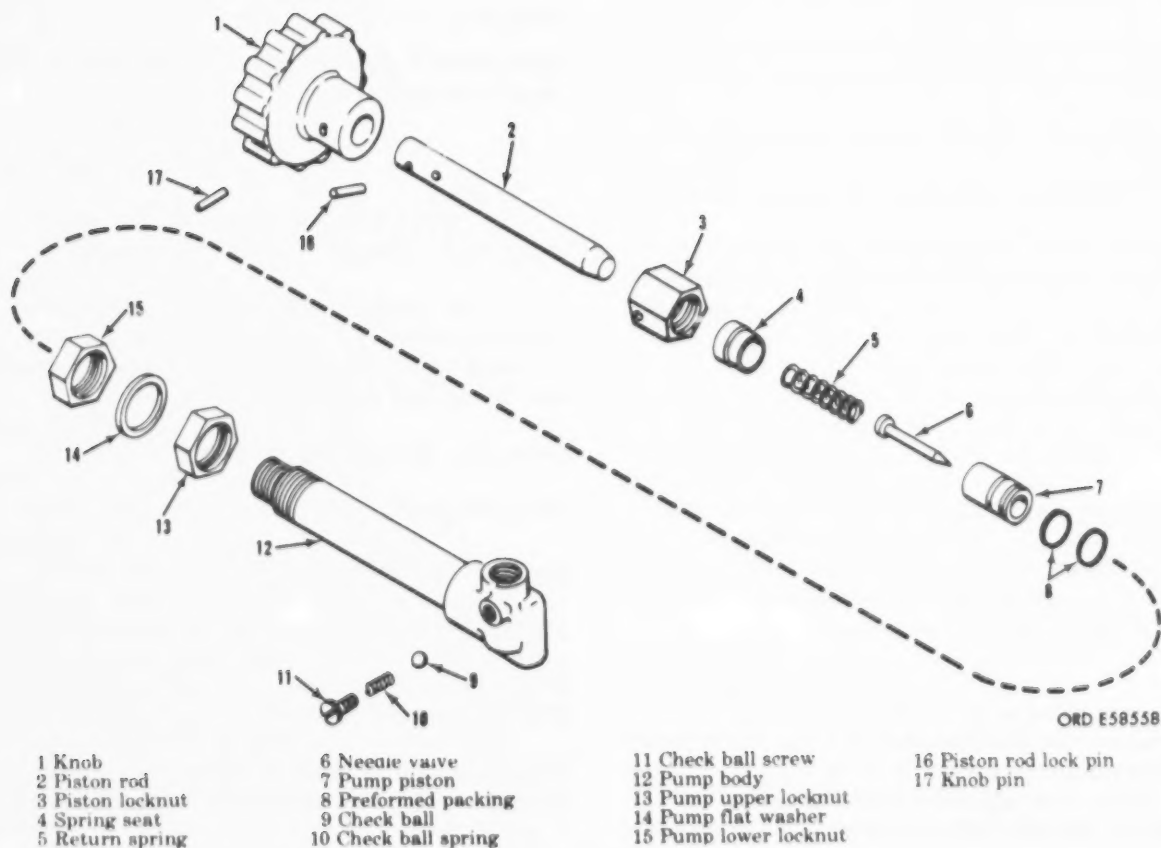


Figure 2-50. Air box heater hand pump (early models) - exploded view.

2-57. Air Box Heater Harness and Ignitor Cable — Early Models
(fig. 2-48)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect wiring harness (7) from ignition coil (5), solenoid valve (25), and receptacle on bracket (34).

(2) Disconnect ignitor cable (26) from ignition coil (5) and air box heater (28).

b. Inspection and Repair. Inspect and repair wiring harness and ignitor cable as described in paragraph 2-131.

c. Installation.

(1) Connect wiring harness (7) to ignition coil (5), solenoid valve (25), air box ignitor and nozzle (28), and receptacle on bracket (34).

(2) Connect ignitor cable (26) to ignition coil (5) and air box heater (28).

2-67.1. Air Box Heater Harness and Ignitor Cable — Late Models and M730A1
(fig. 2-49.1)

a. Removal.

(1) Disconnect wiring harness (9) from air pump (8), ignition coil (45), and solenoid valve (35).

(2) Disconnect ignitor cable (41) from ignition coil (8) and air box heater (23).

b. Inspection and Repair. Inspect and repair wiring harness and ignitor cable as directed in paragraph 2-131.

c. Installation.

(1) Connect two leads from wiring harness (9) to air pump (8), connector to ignition coil (45), and remaining lead to solenoid valve (35).

(2) Connect ignitor cable (41) to ignition coil (8) and air box heater (23).

2-68. Air Box Heater Hoses, Tubes, and Fittings — Early Models (fig. 2-48)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Loosen hose (23) at solenoid valve (25) to release fuel pressure in accumulator (4). Tighten hose (23) when pressure indicator (1) indicates no pressure.

(3) Disconnect fuel hose (12) from accumulator inlet tee (11) and solenoid valve (25).

(4) Disconnect fuel tube (18) from solenoid valve (25) and air box ignitor and nozzle (28), and remove tube.

c. Installation.

(1) Connect fuel tube (18) to solenoid valve (25) and air box ignitor and nozzle (28).

(2) Connect fuel hose (12) to accumulator inlet tee (11) and to solenoid valve (25).

(3) Charge fuel system in accumulator assembly (par. 2-63), and check for fuel and nitrogen leaks.

(4) Connect battery negative lead (para 2-98).

2-68.1. Air Box Heater Hoses, Tubes, and Fittings — Late Models and M730A1 (fig. 2-49.1)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Disconnect hose (17) at fitting (16).

(3) Remove two screws (19), washers (18), and clamps (20), and remove hose (17) from engine.

(4) Disconnect hose (30) from fitting (40) and from check valve (1).

(5) Remove screw (42), washer (43), and clamp (44).

(6) Unwrap tubing (54), and remove hose (39) from engine.

(7) Remove hose (2) from air pump (8). Separate hose and check valve (1).

(8) Unscrew and remove any damaged fittings.

b. Inspection and Repair.

(1) Inspect fuel hose and tube for evidence of leaks and deformation. Replace hose or tube that shows either of these defects.

(2) Inspect fittings for distortion and damaged threads. Replace fittings that show either of these defects.

c. Installation.

(1) Install any new fittings required.

(2) Install hose (2) on check valve (1). Install hose (2) on air pump (8).

(3) Connect hose (39) to check valve (1) and fitting (40).

(4) Position clamp (44) on hose (2), and install hose and clamp to engine with screw (42) and washer (43).

(5) Group electric leads and hose with spiral tubing (54) in two places.

(6) Connect hose (17) to fuel tee fitting (16).

(7) Position clamps (20) on hose (17), and install hose and clamps with two screws (19) washers (18).

(8) Connect battery negative lead (para 2-98).

2-69. Air Box Heater Solenoid Valve — Early Models (fig. 2-48).

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Loosen hose (23) at solenoid valve (25) to release fuel pressure in accumulator (4). Tighten hose (23) when pressure indicator (1) indicates no pressure.

(3) Disconnect fuel tube (18) at solenoid valve (25) and air box ignitor and nozzle (28), and remove tube.

(4) Disconnect wiring harness (7) at solenoid valve (25).

(5) Disconnect fuel hose (23) at solenoid valve (25).

(6) Remove two screws (21) and lock washers (22) securing solenoid valve (25) to bracket (20), and remove solenoid valve.

(7) If new solenoid valve is to be installed, remove elbow (19), fuel tube (18), and tube assembly nut (27) from defective solenoid valve.

b. Inspection and Repair.

(1) Inspect exterior of solenoid valve for cracks, deformation, damage, and fuel leaks.

(2) Inspect solenoid valve for broken or damaged electrical connectors.

(3) Check solenoid valve as described in electrical troubleshooting (para 2-24).

(4) Replace solenoid valve that shows any of these defects.

c. Installation.

(1) If a new solenoid valve is being installed, install elbow (19), fuel tube (18), and tube assembly nut (27) removed from defective solenoid valve.

(2) Position solenoid valve (25) on bracket (20), and secure with two screws (21) and lock washers (22).

(3) Connect fuel hose (23) to solenoid valve (25).

- (4) Connect wiring harness (7) to solenoid valve (25).
- (5) Connect fuel tube (18) to solenoid valve (25) and air box ignitor and nozzle (28).
- (6) Charge fuel pressure in accumulator assembly (para 2-63), and check for fuel and nitrogen leaks.
- (7) Connect battery negative lead (para 2-98).

2-69.1. Air Box Heater Solenoid Valve — Late Models and M730A1 (fig. 2-49.1)

a. Removal.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Disconnect fuel hose (17) at solenoid valve (35).
- (3) Disconnect fuel tube (26) at solenoid valve (35) and air box heater (23), and remove tube.
- (4) Disconnect wiring harness (9) at solenoid valve (35).
- (5) Remove two screws (31) and washers (30) securing solenoid valve (35) to bracket (29), and remove solenoid valve.

(6) If replacement solenoid valve is to be installed, remove elbow (28) and adapter (36) from defective valve.

b. Inspection and Repair.

- (1) Inspect exterior of solenoid valve for cracks, deformation, damage, and fuel leaks. Replace solenoid valve that shows any of these defects.
- (2) Inspect solenoid valve for broken or damaged electrical connectors. Replace solenoid valve that shows either of these defects.

(3) Check solenoid valve as described in electrical troubleshooting (para 2-23). Replace solenoid valve if defective.

c. Installation.

- (1) If replacement solenoid valve is being installed, install elbow (28) and adapter (36) on valve.
- (2) Position solenoid valve (35) on bracket (29), and secure with two washers (30) and screws (31).
- (3) Connect wiring harness (9) to solenoid valve (35).
- (4) Connect fuel tube (26) at solenoid valve (35) and air box heater (23).
- (5) Connect fuel hose (17) at solenoid valve (35).
- (6) Connect battery negative lead (para 2-98).
- (7) Operate system, and check for fuel leaks.

2-70. Air Box Heater — Early Models (fig. 2-48)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect ignitor cable (26) from air box ignitor and nozzle (28).

(2) Disconnect fuel tube (18) at air box ignitor and nozzle (28) and solenoid valve (25).

(3) Remove three screws (16) and washers (17) securing air box ignitor and nozzle (28) and ground lead (24) of wiring harness to engine, and remove air box ignitor and nozzle (28) with preformed packing and gasket. Discard gasket and preformed packing.

b. Inspection and Repair.

- (1) Inspect air box ignitor and nozzle for cracks and deformation.
- (2) Inspect ignitor for pitting, erosion, and cracked insulator.
- (3) Inspect fuel nozzle for clogging.
- (4) Replace air box ignitor and nozzle showing any of these defects.

c. Installation.

- (1) Install new preformed packing on air box ignitor and nozzle (28).
- (2) Position new gasket, air box ignitor and nozzle (28), and ground lead (24) of wiring harness on engine, and secure with three screws (16) and washers (17).
- (3) Install fuel tube (18) between air box ignitor and nozzle (28) and solenoid valve (25), and tighten nuts.
- (4) Connect ignitor cable (26) to air box ignitor and nozzle (28).

2-70.1. Air Box Heater — Late Models and M730A1 (fig. 2-49.1)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect ignitor cable (41) from air box heater (23).
- (2) Disconnect fuel tube (26) at air box heater (23) and solenoid valve (35), and remove tube.
- (3) Remove screw (38) and washer (24) securing ground lead of wiring harness (9) and one ear of air box heater (23) to engine.
- (4) Remove two screws (25) and washers (24) securing balance of air box heater (23) to engine, and remove heater, gasket(21), and preformed packing (22). Discard gasket and packing.

b. Inspection and Repair. Inspect air box heater assembly as follows:

- (1) Inspect air box heater body for cracks and deformation.
- (2) Inspect ignitor for pitting, erosion, and cracked insulator.
- (3) Inspect fuel nozzle for clogging.
- (4) Replace air box heater assembly that shows any of these defects.

c. Installation.

(1) Install new preformed packing on air box heater (23).

(2) Position new gasket (21) and air box heater (23) on engine, and install two washers (24) and screws (25).

(3) Position ground lead of wiring harness (9) to air box heater, and install washer (24) and screw (38). Tighten three screws.

(4) Connect fuel tube (26) at air box heater (23) and solenoid valve (35).

(5) Connect ignitor cable (41) to air box heater (23).

2-71. Air Box Heater Switch

(fig. 2-35)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect leads (4 and 5) from switch (3).

(3) Remove two screws (1) and washers (2) securing switch to instrument panel (26), and remove switch.

b. Inspection and Repair. Check air box heater switch as described in electrical troubleshooting (para 2-24). Replace switch if defective.

c. Installation.

(1) Position switch (3) on instrument panel (26), and secure with two washers (2) and screws (1).

(2) Connect leads (4 and 5) to switch.

(3) Install instrument panel (para 2-92).

(4) Turn master switch ON, and check air box heater switch for functional operation.

2-72. Air Cleaner

(fig. 2-51)

a. Removal.

(1) Release four latches securing case to air cleaner head, and remove case.

(2) Disengage clamp, and remove flexible hose from cleaner head.

(3) Remove four screws and washers, and

remove air cleaner head from tool tray mounting bracket.

b. Inspection and Repair.

(1) Inspect latches for deformation and insecure mounting. Replace air cleaner that shows either of these defects.

(2) Inspect mounting surfaces for cracked or excessively worn edges. Replace air cleaner that shows either of these defects.

c. Installation.

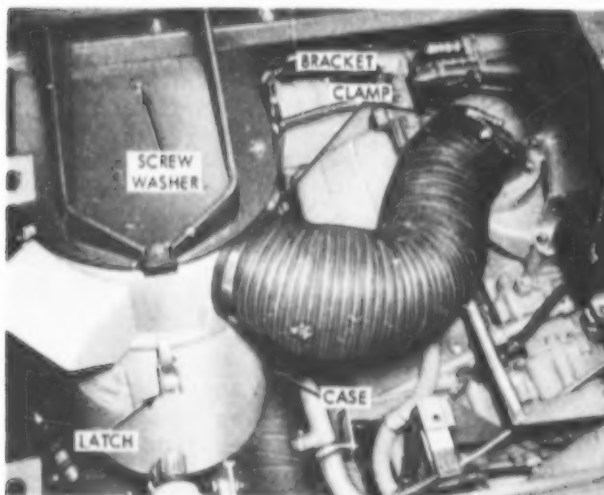
CAUTION

Two types of noninterchangeable air cleaner heads, elements, and cases may be installed on carrier. When replacing any part of air cleaner assembly, make certain part being installed is same type and part number as item removed.

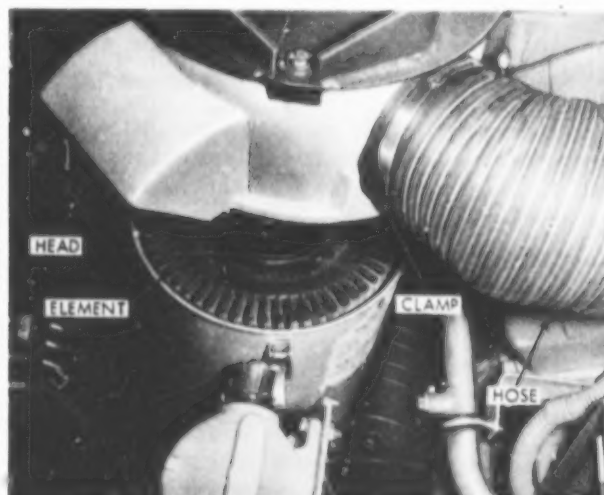
(1) Position air cleaner head to mounting bracket, and secure with four washers and screws.

(2) Position flexible hose and clamp on air cleaner head, and tighten clamp.

(3) Position case to air cleaner head, and fasten latches.



A-AIR CLEANER, HOSE, AND CLAMPS



B-AIR CLEANER ELEMENT

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Figure 2-51. Air cleaner, element, and hose.

2-73. Air Cleaner Element

(fig. 2-51)

a. Removal.

(1) Release four latches securing case to air cleaner head.

(2) Remove element from case.

b. Cleaning, Inspection, and Repair.

(1) Inspect element for frayed or deformed condition. Replace element that shows either of these defects.

(2) Clean element by using 15 psi moisture-free compressed air as follows:

(a) Blow dirt off inside of element.

(b) Blow dirt off outside of fins.

(c) Blow dirt off inside of element again.

NOTE

If compressed air is not available, emergency cleaning can be accomplished

by gently tapping fins by hand. Be sure to tap sides gently, and do not strike ends of element.

c. Installation.

CAUTION

Two types of noninterchangeable air cleaner elements may be installed on carrier. When replacing element, make certain element being installed is same type and part number as item removed.

(1) Insert element into case.

(2) Position case containing element to air cleaner head, and secure with four latches.

CAUTION

Operation with dirty or improper air cleaner element can cause severe engine damage due to overheating or abrasive action. Make sure element is clean, properly installed, and matches air cleaner assembly (TM 9-1450-585-10).

2-74. Cleaner Hose and Clamps

(fig. 2-51)

a. Removal.

(1) Remove two clamps securing flexible hose to air cleaner head and engine air inlet.

(2) Remove flexible hose from air cleaner head and engine air inlet.

b. Inspection and Repair.

(1) Inspect flexible hose for accumulated dirt, and worn or deformed condition. Clean out accumulated dirt. Replace flexible hose that shows worn, deformed condition, holes, or tears.

(2) Inspect clamps for deformation and excessive wear. Replace clamps that show either of these defects.

c. Installation.

(1) Position flexible hose and two clamps on engine air inlet and on air cleaner head.

(2) Tighten two clamps to secure flexible hose at both ends.

2-75. Air Cleaner Indicator and Hose

(fig. 2-52).

NOTE

Indicator is installed on carriers after C-308.

a. Removal.

(1) Disconnect indicator hose (1) at air cleaner indicator (6), and remove fitting (2) and elbow (5) from indicator.

(2) Remove two screws (7), washers (4), and nuts (3) securing indicator (6) to transverse beam. Remove indicator and gasket (5.1).

NOTE

Do not discard gasket unless indicator is being replaced.

(3) Disconnect indicator hose (1) and fitting (9). Remove fitting (9), bushing (10), and tee (11) from engine air intake fitting (9.1). Remove fitting (9.1) from air intake.

(4) Remove two screws (15), washers (13), nuts (12), and clamps (14) securing hose (1) to transverse beam, and remove hose.

b. Inspection and Repair.

(1) If test (d below) shows improper operation of indicator, or if indicator stays on red in window after air cleaner element is cleaned, replace indicator.

(2) Inspect elbow, tee, bushings, and fittings for burred or damaged threads, cracks, and deformations. Remove burs. Replace elbow, tee, bushings, and fittings that show any other defects.

(3) Inspect filter fitting for damaged threads and filter. Replace air cleaner indicator (filter fitting supplied with indicator) if fitting shows either of these defects.

(4) Inspect indicator hose for cracks and indication of collapse. Replace hose that shows either of these defects.

c. Installation.

(1) Clean tapered pipe threads, and apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426).

(2) Clean external threads of straight pipe fittings, and apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761).

(3) Position air cleaner indicator (6) and gasket (5.1) on transverse beam, and secure with two screws (7), washers (4), and nuts (3).

(4) Install one elbow (5) and fitting (2) on indicator, and connect indicator hose (1) at indicator.

(5) Install one tee (11), bushing (10), and filter fitting (9) on engine air intake (8), and connect indicator hose (1) and air pump hose at air intake.

(6) Position indicator hose (1) to transverse beam, and secure with two clamps (14), screws (15), washers (13), and nuts (12).

d. Test.

(1) With transmission range selector in neutral and engine running at 800 rpm, cover air intake opening on air cleaner head with a piece of heavy cardboard or similar material to simulate 27 inches water (vacuum). Check window of indicator; window should have turned red.

(2) Shut off engine, and remove restriction (cardboard) from air cleaner; indicator window should remain red.

(3) Press manual reset located at top of indicator; window should change to green.

(4) If indicator does not function as above, replace indicator (a above).

2-76. Exhaust Pipes

a. Removal (M730, fig. 2-53).

(1) Remove two crossover pipe clamps (3) securing left and right crossover pipes (19 and 20) to engine exhaust manifolds (fig. 2-26).

(2) Remove exhaust pipe clamp (2) securing exhaust pipe (1) to muffler (4).

(3) Remove exhaust pipes from power plant compartment.

b. Removal (M730A1, fig. 2-53.1).

(1) Remove two crossover pipe clamps (13) securing left and right crossover pipes (14 and 15) to engine exhaust manifolds.

(2) Remove exhaust pipe clamp (17) securing exhaust pipe (16) to muffler (3).

(3) Remove exhaust pipes from power plant compartment.

c. *Inspection and Repair.* Inspect exhaust pipes for cracks and deformation. Replace exhaust pipes that show either of these defects.

NOTE

Make sure ballsockets of exhaust pipe are alined with crossover pipe before tightening clamps. This is required to keep ballsockets from leaking exhaust gases.

d. Installation (M730, fig. 2-53).

(1) Position left crossover pipe (19) to left engine exhaust manifold and right crossover pipe (20) to right engine exhaust manifold, and install two crossover pipe clamps (3) loosely.

(2) Install exhaust pipe (1) on left crossover pipe (19), rotate on ball joint to aline with exhaust muffler (4), and install exhaust pipe clamp (2).

(3) Tighten all three clamps to 16 to 18 pound-feet torque.

e. Installation (M730A1, fig. 2-53.1).

(1) Position left crossover pipe (15) to left engine exhaust manifold and right crossover pipe (14) to right engine exhaust manifold, and install two crossover pipe clamps (13) loosely.

(2) Install exhaust pipe (16) on left crossover pipe (15), rotate on ball joint to aline with exhaust muffler (3), and install exhaust pipe clamp (17).

(3) Tighten all three clamps to 16 to 18 pound-feet torque.

2-77. Exhaust Duct (M730, fig. 2-53)

a. *Removal.* Remove two screws (7) and washers (6) securing exhaust duct (5) to hull, and remove duct.

NOTE

If flotation curtain is installed on carrier, flotation curtain exhaust duct (fig. 2-189) is installed in a similar manner.

b. *Inspection and Repair.* Inspect duct for dents, cracks, and deformation. Straighten deformation and dents, and weld cracks as required. Replace duct if defects cannot be repaired.

c. *Installation.* Position exhaust duct (5) on hull, and secure with two screws (7) and washers (6).

NOTE

Do not over tighten screws or blind rivet, nuts will break.

NOTE

If flotation curtain is installed on carrier, flotation curtain exhaust duct (fig. 2-189) is installed in a similar manner.

2-77.1. Flanged Outlet Pipe and Ducts (M730A1, fig. 2-53.1)

a. Removal.

(1) Remove two screws (10) and washers (9) securing duct (8). Remove duct (8) from carrier.

(2) Remove clamp (17) securing exhaust ball joint pipe (16) to inlet of muffler (3).

(3) Remove four screws (2) securing muffler mounting plates (1) to bulkhead. Remove muffler from flanged outlet pipe (4).

(4) Remove six nuts (11), 12 washers (12), and six screws (18) from flanged outlet pipe (4). Remove flanged outlet pipe (4) with gasket (5) from plenum.

(5) Loosen clamp (6), and remove duct (7) from flanged outlet pipe (4).

b. Inspection and Repair.

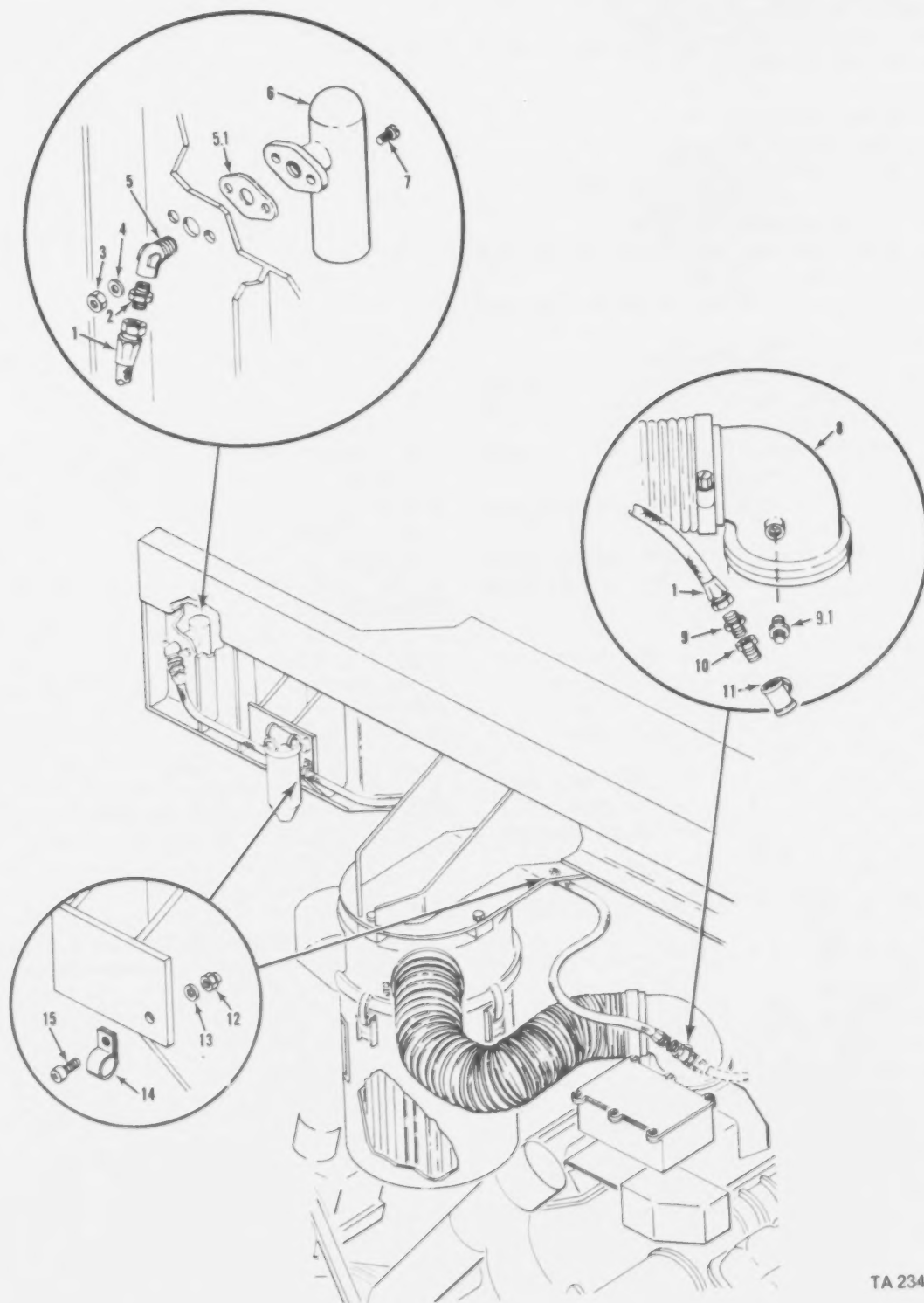
(1) Inspect flanged outlet pipe and ducts for cracks and deformation. Straighten deformations and dents and weld cracks as required. Replace parts if defects cannot be repaired.

(2) Inspect couplings and joints for damaged threads and deformations. Replace clamps and joints that show either defect.

c. Installation.

(1) Install duct (7) on flanged outlet pipe (4), and secure with clamp (6).

(2) Position flanged outlet pipe assembly (4, 7, and 6) and gasket (5) on inside of plenum. Secure flanged outlet pipe (4) and gasket (5) to plenum using six screws (18), 12 washers (12), and six nuts (11).



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Figure 2-52. Air cleaner indicator.

Legend to fig. 2-52

- | | | |
|---------------------------------------|------------------------------------|--------------------------------|
| 1 Air cleaner indicator hose assembly | 6 Air cleaner indicator assembly | 11 Engine air intake tee |
| 2 Indicator fitting | 7 Indicator mounting screw | 12 Indicator hose clamp nut |
| 3 Indicator mounting nut | 8 Engine air intake | 13 Indicator hose clamp washer |
| 4 Indicator mounting washer | 9 Engine air intake filter fitting | 14 Indicator hose clamp |
| 5 Indicator elbow | 9.1 Air inlet fitting | 15 Indicator hose clamp screw |
| 5.1 Gasket | 10 Engine air intake bushing | |

(3) Position muffler (3) in flanged outlet pipe (4) and on bulkhead. Secure muffler mounting plates (1) to bulkhead with four screws (2).

(4) Connect duct (8) to duct (7), and secure duct (8) to carrier with two screws (10) and washers (9).

(5) Aline ball joint pipe (16) with inlet of muffler (3), and secure with clamp (17). Tighten clamp nut to 16 to 18 pound-feet torque.

2-78. Exhaust Muffler

a. Removal (M730, fig. 2-53).

(1) Disengage exhaust pipe clamp (2) securing exhaust pipe (1) to exhaust muffler (4).

(2) Pull exhaust pipe (1) away from muffler, and rotate exhaust pipe in ball joint until clear of muffler.

(3) Remove exhaust duct (para 2-77).

(4) Remove two nuts (12) and washers (11) securing exhaust muffler support rod (8), plate (9), and spring (10) to exhaust muffler support, and remove rod, plate, and spring.

(5) Remove clamp (14) securing flange (15) at inlet side of muffler.

(6) Remove six screws (18), washers (17), and nuts (21) securing flange (15) to bulkhead.

(7) Remove exhaust muffler with flange and gasket (16) from exhaust compartment, and separate flange and gasket from muffler. Discard gasket.

(8) Remove and discard exhaust muffler support insulation (13).

b. Removal (M730A1, fig. 2-53.1).

(1) Remove clamp (17) on ball joint pipe (16) and inlet to muffler (3), and disengage pipe from muffler.

(2) Remove four screws (2) securing two plates (1) and muffler (3) to bulkhead. Remove muffler (3) by disengaging from outlet pipe (4) attached to plenum.

(3) If plates (1) are to be removed from muffler (3), mark position of muffler brackets on plates for

installation. Remove four nuts (21), screws (19), and washers (20) securing two plates (1) to muffler (3). Remove two plates.

c. Inspection and Repair.

(1) Inspect muffler for holes, cracks, and deformation. Replace muffler that shows any of these defects.

(2) Inspect plates for holes, cracks, and deformation. Replace plates if necessary.

d. Installation (M730, fig. 2-53).

(1) Install new exhaust muffler support insulation (13) on exhaust muffler support so that graphited side will make contact with muffler.

(2) Position exhaust muffler (4) with flange (15) and new gasket (16) into exhaust compartment so that exhaust side of muffler is 7/8 to 1-1/8 inches from right side of hull.

(3) Install exhaust muffler support plate (9), rod (8), and spring (10) on muffler support, and secure with two washers (11) and nuts (12). Tighten rear nut (12) to compress spring (10) to 1-15/16 to 2-1/16 inches length.

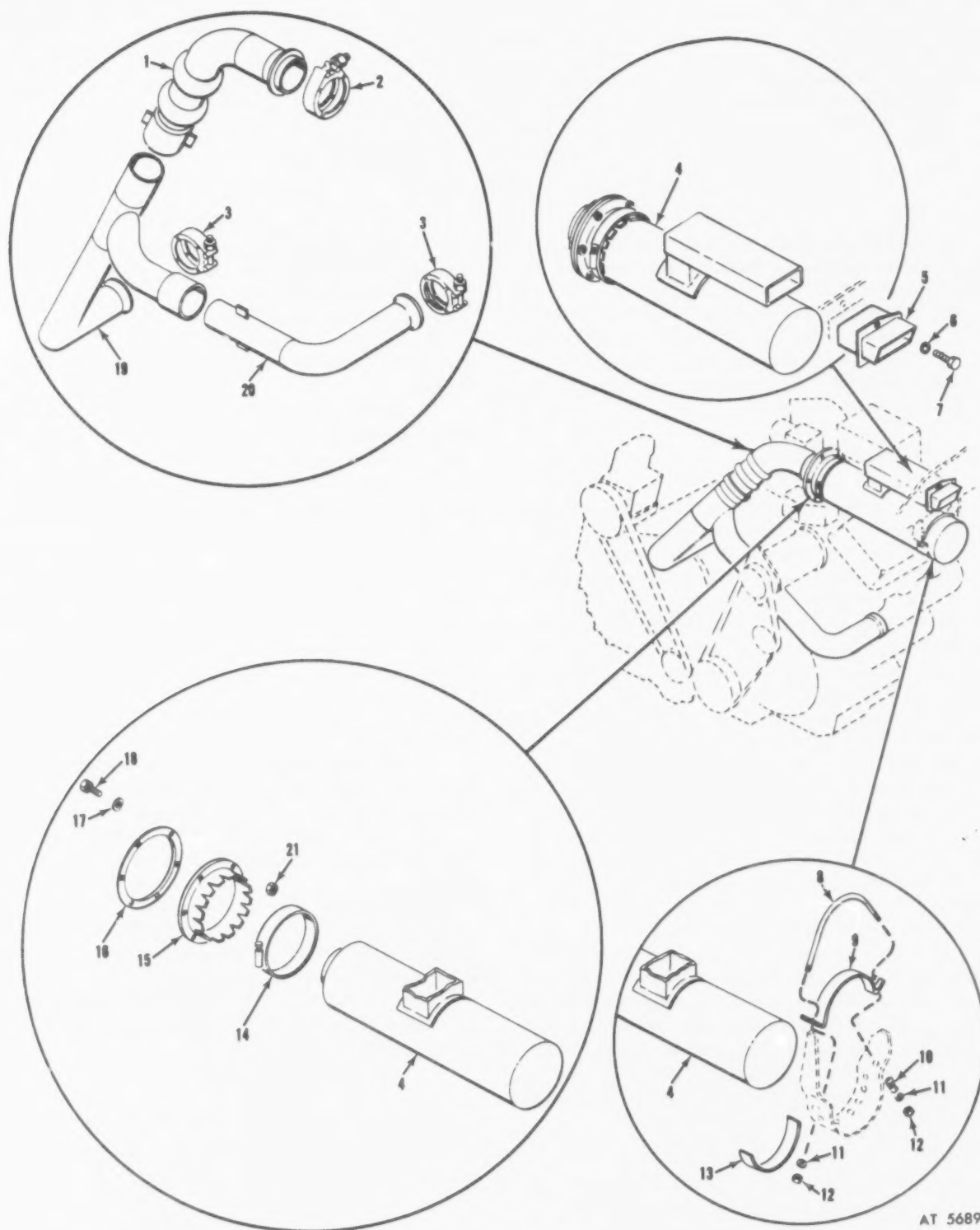
(4) Position flange (15) and new gasket (16) to bulkhead at inlet side of muffler, and secure with six screws (18), washers (17), and nuts (21).

(5) Install clamp (14) on flange at inlet side of muffler. Tighten clamp nut to 5 to 6 pound-feet torque.

(6) Install exhaust duct (para 2-77).

(7) Rotate exhaust pipe (1) in ball joint until pipe is alined with muffler, and push pipe to muffler to aline mating surfaces.

(8) Install exhaust pipe clamp (2) on exhaust pipe (1) and exhaust muffler (4). Tighten clamp nut to 16 to 18 pound-feet torque.



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Figure 2-53. Exhaust pipes, muffler, and ducts (M730).

Legend to fig. 2-53.

- | | |
|-------------------------------|---------------------------|
| 1 Engine exhaust pipe | 12 Support nut |
| 2 Exhaust pipe clamp | 13 Support insulation |
| 3 Crossover pipe clamp | 14 Exhaust muffler clamp |
| 4 Exhaust muffler | 15 Exhaust muffler flange |
| 5 Exhaust duct | 16 Flange gasket |
| 6 Exhaust duct washer | 17 Flange mounting washer |
| 7 Exhaust duct screw | 18 Flange mounting screw |
| 8 Exhaust muffler support rod | 19 Left crossover pipe |
| 9 Support plate | 20 Right crossover pipe |
| 10 Support spring | 21 Flange mounting nut |
| 11 Support washer | |

e. Installation (M730A1, fig. 2-53.1).

(1) Aline two plates (1) on muffler (3), and secure with four screws (19), washers (20), and nuts (21).

(2) Position muffler (3) on rear engine bulkhead while engaging outlet pipe (4). Secure with four

screws (2) securing two plates (1) to engine compartment bulkhead.

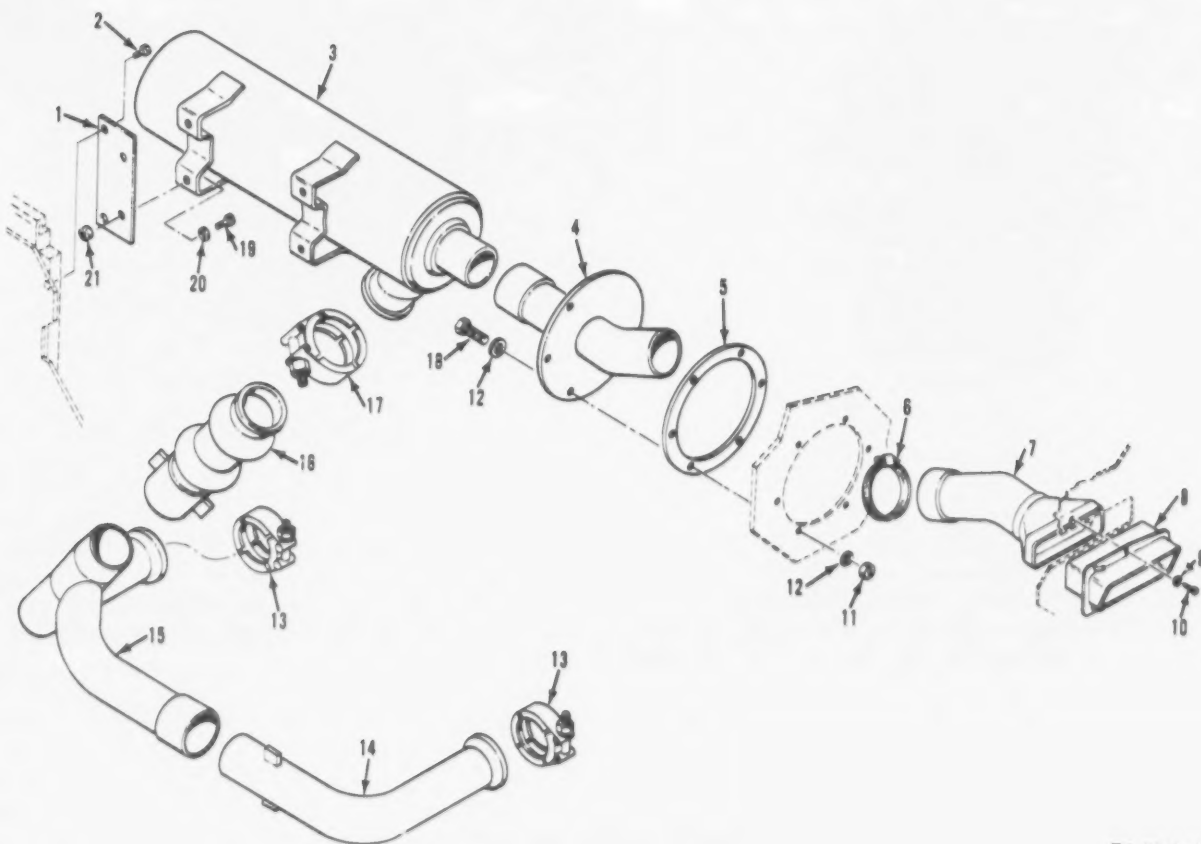
(3) Aline ball joint pipe (16) to inlet of muffler (3), and secure with clamp (17). Apply 16 to 18 pound-feet torque to clamp nut.

Section X. COOLING SYSTEM

2-79. General

a. Scope. This section contains instructions for filling and draining the cooling system; and for removal, adjustment, cleaning, inspection, repair, disassembly and assembly (as required), and installation of the coolant pump drive-belts, fan drive-belts, coolant pump idler pulley, thermostat, coolant hoses and tubes, coolant pump, fan drive-belt idler pulley and adjusting linkage, cooling fan assembly, and radiator.

b. Description. The engine cooling system consists of a radiator, radio frequency interference shielded fan, coolant pump, thermostat, oil cooler, and connecting hoses and tubes. The cooling fan and radiator are mounted on the right side of the power plant compartment. The cooling fan is positioned vertically and forward of the inclined radiator. The fan is belt-driven by a pulley on the transfer gearcase, through a jackshaft, to a pulley centered on the fan. The coolant pump, thermostat, and oil cooler are integral parts of the engine assembly. Coolant is drawn by the pump from the bottom of the radiator and circulated through the oil cooler, cylinder block, and cylinder heads to the



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- | | |
|-----------------|----------------|
| 1 Plate (2) | 12 Washer (12) |
| 2 Screw (4) | 13 Clamp (2) |
| 3 Muffler | 14 Pipe |
| 4 Pipe | 15 Pipe |
| 5 Gasket | 16 Pipe |
| 6 Clamp | 17 Clamp |
| 7 Duct assembly | 18 Screw (6) |
| 8 Duct assembly | 19 Screw (4) |
| 9 Washer (2) | 20 Washer (4) |
| 10 Screw (2) | 21 Nut (4) |
| 11 Nut (6) | |

Figure 2-53.1. Exhaust pipes and muffler (M730A1).

thermostat housing. The thermostat is a full bypass type with a range of 162° to 167°F. (closed) and 180° to 182°F. (fully open). A pressure cap on the radiator prevents excessive pressure or vacuum buildup in the cooling system.

c. *Torque Wrench Specifications.* Refer to table 2-15 for torque tightness readings for the more critical points of the cooling system.

Table 2-15. Cooling System Torque Wrench Specifications

Key No.	Fig. No.	Location	Pound-feet torque
2-57	9	Nut securing fan drive belt idler pulley to arm.	50-55
2-55	19 & 22	Two cap screws securing engine coolant pump idler pulley.	30-35

2-80. Cooling System Fill and Drain (fig. 2-54)

a. Filling Cooling System.

NOTE

Make certain all drain valves are closed and drain plugs and connections are secure before filling cooling system.

- (1) Remove coolant filler cap.

CAUTION

Remove coolant filler cap slowly to relieve pressure and to avoid injury to personnel.

- (2) Fill system with coolant (approx 9.5 gal).

Refer to TB750-651.

NOTE

During initial radiator fill or refill, add coolant slowly, particularly the last few quarts to permit any trapped air to escape. Bring level to bottom of radiator filler neck.

- (3) Install coolant filler cap.

- (4) Start and run engine until operating temperature (160° to 200°F.) is reached (TM 9-1450-585-10).

CAUTION

Do not allow engine to operate for sustained periods if coolant temperature gage indicates above 200°F. Serious damage to engine may result.

- (5) Stop engine, and check coolant level. Add coolant, as necessary to bring level to bottom of filler neck.

NOTE

If engine coolant temperature gage still indicates 200°F., or above, stop engine,

and inspect to make certain that: air cleaner element is clean, properly installed, and matches air cleaner assembly (TM 9-1450-585-10); fan and water pump drive-belts are properly adjusted and drive pulleys are tight; air intake grille and radiator air passages are clean and free of debris; and engine oil is at correct level and of proper grade (LO 9-1450-585-12).

b. Draining Cooling System.

CAUTION

Remove coolant filler cap slowly to relieve pressure and to avoid injury to personnel.

- (1) Remove radiator cap.

- (2) Remove hull bottom access cover (para 2-223).

- (3) Place suitable container under carrier, open drain valve at bottom of transmission oil cooler housing, and allow coolant to drain.

- (4) Open drain valve on both sides of engine block, and allow coolant to drain.

- (5) Open drain valve at bottom of thermostat housing, and allow coolant to drain.

- (6) Remove two plugs from two coolant tubes, and allow coolant to drain.

CAUTION

Cooling system components are made of aluminum and require cleaning and flushing only under unusual conditions. This operation must be performed by direct support maintenance personnel.

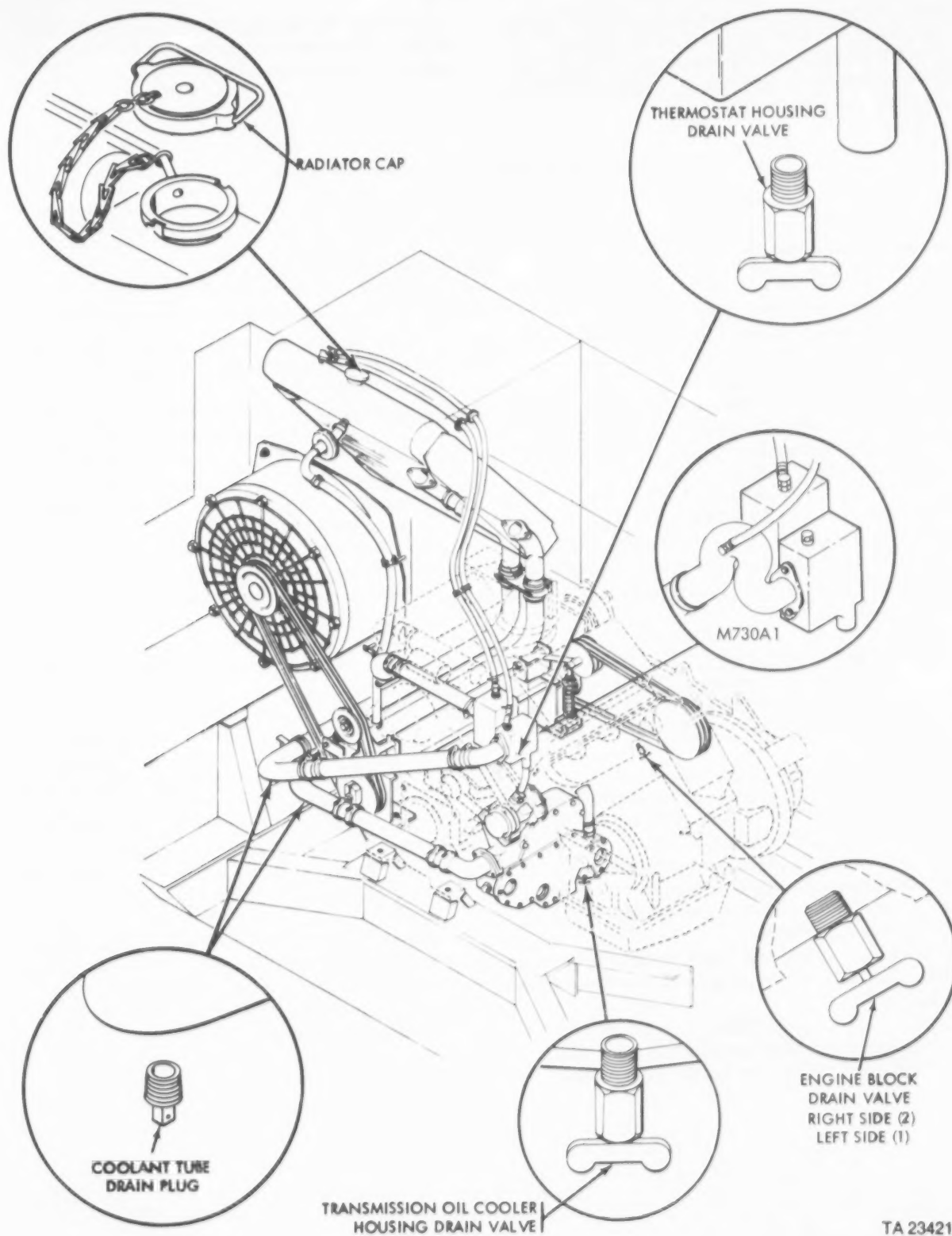


Figure 2-54. Cooling system.

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2-81. Coolant Pump Drive-Belts

(fig. 2-55)

a. Adjustments.

(1) Loosen pivot cap screw (19) on idler adjusting bracket (16).

(2) Loosen adjusting cap screw (22) on bracket slot, and position bracket to obtain $\frac{3}{8}$ inch play between one drive-belt (1) and straight edge of other drive-belt in matching set when applying firm push with thumb at point midway between pulley (21) and coolant pump (8).

(3) Tighten cap screw (19) and cap screw (22) to 30 to 35 pound-feet torque.

b. Removal.

(1) Loosen cap screw (19) and cap screw (22)

securing coolant pump idler adjusting bracket (16) to engine.

(2) Remove two drive-belts (1) from pulley (20), pulley (21), and coolant pump (8).

c. Inspection and Repair. Inspect both drive-belts for broken, frayed, or cracked condition. Replace drive-belts that show any of these defects.

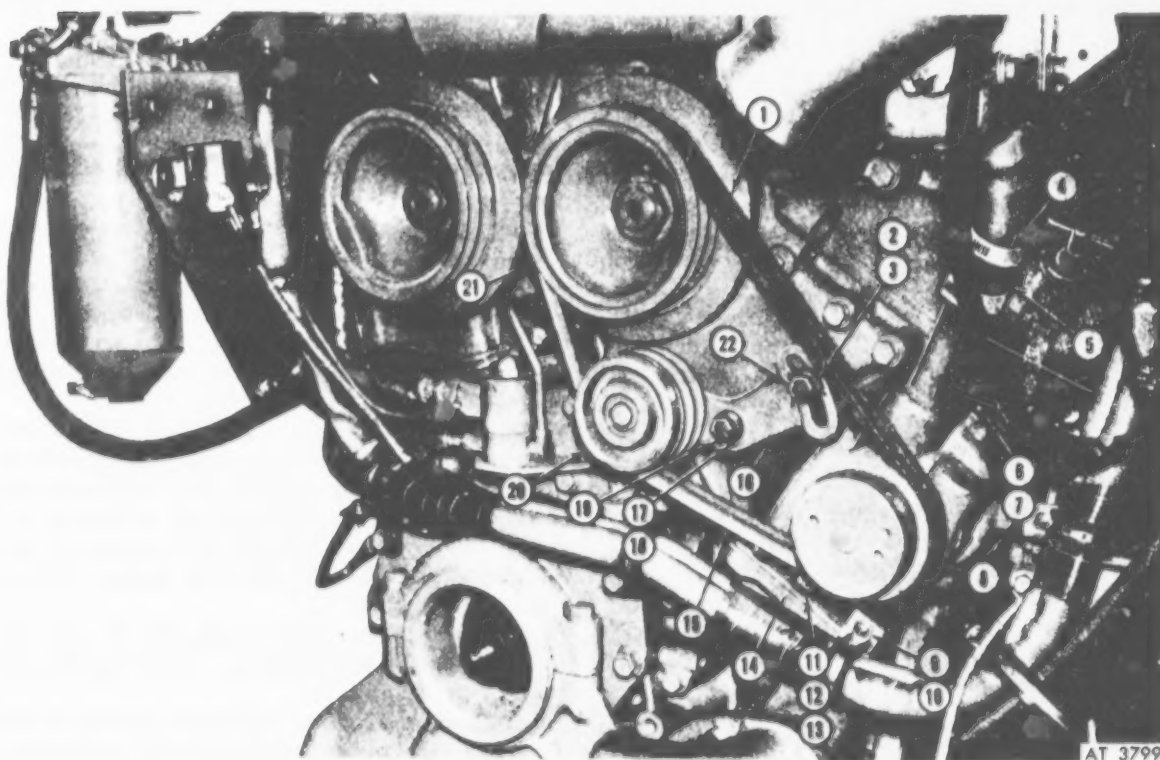
NOTE

Always replace both drive-belts as a matched set.

d. Installation.

(1) Install two drive-belts (1) on pulley (20), pulley (21), and coolant pump (8).

(2) Adjust drive-belts (a above).



- 1 Drive-belt
- 2 Adjusting bracket lock washer
- 3 Adjusting bracket flat washer
- 4 Hose clamp
- 5 Bypass tube hose
- 6 Oil level gage rod tube cap screw
- 7 Oil level gage rod tube self-locking nut
- 8 Coolant pump
- 9 Wiring harness clamp machine screw
- 10 Wiring harness clamp nut
- 11 Coolant pump cap screw

- 12 Coolant pump lock washer
- 13 Coolant pump flat washer
- 14 Coolant pump gasket
- 15 Coolant pump socket head screw
- 16 Adjusting bracket
- 17 Adjusting bracket lock washer
- 18 Adjusting bracket flat washer
- 19 Adjusting bracket cap screw
- 20 Idler pulley
- 21 Engine pulley
- 22 Adjusting bracket cap screw

Figure 2-55. Coolant pump drive-belts, idler pulley, and pump.

2-82. Coolant Pump Idler Pulley and Linkage (fig. 2-55)

a. Removal.

(1) Remove two coolant pump drive-belts (para 2-81).

(2) Remove adjusting cap screw (22), lock washer (2), and flat washer (3) from adjusting bracket (16).

(3) Remove pivot cap screw (19), lock washer (17), and flat washer (18) from adjusting bracket (16).

(4) Remove idler pulley (20) with adjusting bracket (16).

b. *Inspection and Repair.* Inspect idler pulley for rough or uneven rotation. Replace idler pulley with adjusting bracket that shows either of these defects.

c. Installation.

(1) Position idler pulley (20) with adjusting bracket (16) to engine.

(2) Install cap screw (19), lock washer (17), and flat washer (18). Do not tighten cap screw.

(3) Install cap screw (22), lock washer (2), and flat washer (3). Do not tighten cap screw.

(4) Install two coolant pump drive-belts (1), and adjust drive-belts (para 2-81).

2-83. Coolant Pump (fig. 2-55)

a. Removal.

(1) Drain cooling system (para 2-80).

(2) Remove coolant pump drive-belts (para 2-81).

(3) Loosen hose clamps (4).

(4) Remove cap screw (6) and nut (7) securing oil level gage bracket to housing.

(5) Remove four cap screws (11), flat washers (13), lock washers (12), and one socket head screw (15), and remove pump (8) and gasket (14) from oil cooler housing. Discard gasket.

(6) Remove hose clamps (4) and bypass tube hose (5) from coolant pump (8).

b. *Inspection and Repair.* Inspect pump for evidence of leaks and rough or binding shaft and pulley. Replace pump that shows any of these defects.

c. Installation.

(1) Position bypass tube hose (5) and clamps (4) on coolant pump (8).

(2) Position new gasket (14) and coolant pump (8) to oil cooler housing, and secure with four lock washers (12), flat washers (13), cap screws (11), and one socket head screw (15).

(3) Tighten hose clamps (4).

(4) Position oil level gage bracket to housing, and secure with screw (6) and nut (7).

(5) Install coolant pump drive-belts (para 2-81).

(6) Fill cooling system (para 2-80).

(7) Start engine, and check for leaks.

2-84. Thermostat

a. Removal (M730, fig. 2-56).

(1) Drain cooling system (para 2-80).

(2) Remove two screws (2) and tab washers (3), and separate outlet elbow (1) from thermostat housing (7). Remove and discard gasket (4) and washers (3).

(3) Disconnect housing-to-pump bypass tube (9) from housing (7).

(4) Disconnect vent hose (5) from housing.

(5) Remove four screws (10) and washers (11), and remove thermostat housing from engine. Remove and discard gasket (6). Remove bracket (8) securing oil fill tube and wiring harness from thermostat housing.

(6) Remove thermostat and seal. Discard seal.

b. Removal (M730A1, fig. 2-57.1)

(1) Drain cooling system (para 2-80).

(2) Remove two screws (14) and tab washers (13), and separate air separator elbow (12) from thermostat housing (4). Remove and discard gasket (11) and washers (13).

(3) Loosen two clamps (9) and disconnect housing-to-pump bypass tube (10) from housing (4).

(4) Remove two screws (8), lock washers (7), and flat washers (6) securing bracket (5) to housing (4).

(5) Remove two screws (8), lock washers (7), flat washers (6), and housing (4) from engine. Discard four lock washers (7).

(6) Remove gasket (1), thermostat (2), and seal (3) from thermostat housing (4). Discard gasket and seal.

c. *Inspection and Repair.* Place thermostat in container of water and heat, but do not allow thermostat to touch the bottom of container. Agitate water to maintain an even temperature. As water becomes hot, thermostat valve should begin to open at 162°—167°F., should be fully open at 180°—182°F. If thermostat does not meet these requirements, replace thermostat.

d. Installation (M730, fig. 2-56).

(1) Install new seal in thermostat housing (7).

(2) Install thermostat, bellows end first, in engine.

(3) Put a thin coat of sealing compound MIL-S-45180 (8030-00-656-1426) on both sides of new gasket (6).

(4) Position new gasket (6) and thermostat housing (7) on engine. Position oil fill tube and wiring harness bracket (8) to thermostat housing, and secure housing and bracket with four washers (11) and screws (10).

(5) Connect vent hose (5) to housing (7).

(6) Connect housing-to-pump bypass tube (9) to housing. Tighten clamps.

(7) Put a thin coat of sealing compound MIL-S-45180 (8030-00-656-1426) on both sides of new gasket (4).

(8) Position new gasket (4) and outlet elbow (1) to thermostat housing, and secure with two new washers (3) and screws (2).

(9) Fill cooling system (para 2-80).

(10) Start engine and check for leaks.

e. *Installation* (M730A1, fig. 2-57.1)

(1) Install new seal (3) in thermostat housing (4).

(2) Install thermostat (2), bellows end first in engine.

(3) Put a thin coat of sealing compound MIL-S-45180 (8030-00-656-1426) on both sides of new gasket (1).

(4) Position new gasket (1) and thermostat housing (4) on engine. Position bracket (5) to housing (4) and secure housing and bracket to engine with four flat washers (6), lock washers (7), and screws (8).

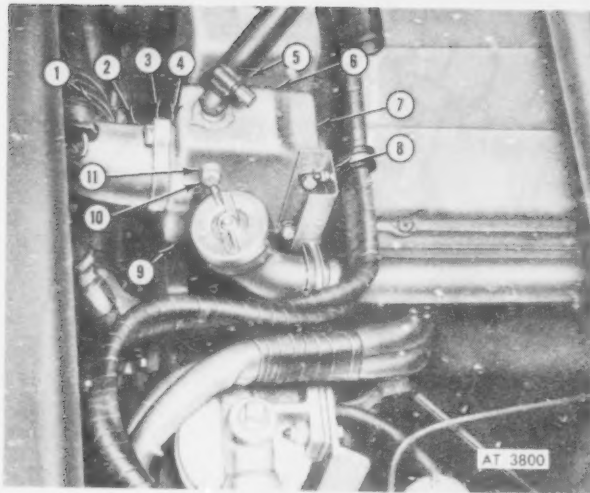
(5) Connect housing-to-pump bypass tube (10) to thermostat housing (4) and tighten two clamps (9).

(6) Put a thin coat of sealing compound MIL-S-45180 (8030-00-656-1426) on both sides of new gasket (11).

(7) Position new gasket (11) and air separator elbow (12) to thermostat housing (4), and secure with two tab washers (13) and screws (14).

(8) Fill cooling system (para 2-80).

(9) Start engine and check for leaks.



- 1 Outlet elbow
- 2 Outlet elbow screw
- 3 Tab washer
- 4 Elbow gasket
- 5 Vent hose
- 6 Thermostat housing gasket
- 7 Thermostat housing
- 8 Clamp bracket
- 9 Housing-to-pump bypass tube
- 10 Thermostat housing screw
- 11 Housing screw washer

Figure 2.56. Thermostat (M730).

2-85. Fan Drive-Belts (fig. 2-57)

NOTE

There are two sets of fan drive-belts: a

front set and a rear set. The following adjustment applies to both.

a. Adjustment.

(1) To tighten fan drive-belts:

(a) Loosen jam nut (21).

(b) Turn nut assembly (20) clockwise until nut assembly is in operating range indicated on plate on sleeve (18).

(c) Turn jam nut clockwise until snug against nut assembly.

(2) To loosen fan drive-belts:

(a) Loosen jam nut (21).

(b) Turn nut assembly (20) counterclockwise until nut assembly is in operating range indicated on plate on sleeve (18).

(c) Turn jam nut clockwise until snug against nut assembly.

b. Removal.

(1) Loosen fan drive-belts as much as possible (a (2) above).

(2) Remove two drive-belt sets (15 and 12) from pulleys.

c. *Inspection and Repair.* Inspect fan drive-belts for broken, cracked, or frayed condition. Replace fan drive-belts that show any of these defects.

NOTE

Always replace both drive-belts as a matched set.

d. Installation.

(1) Install two fan drive-belt sets (15 and 12) on pulleys.

(2) Adjust fan drive-belts to correct tension (a above).

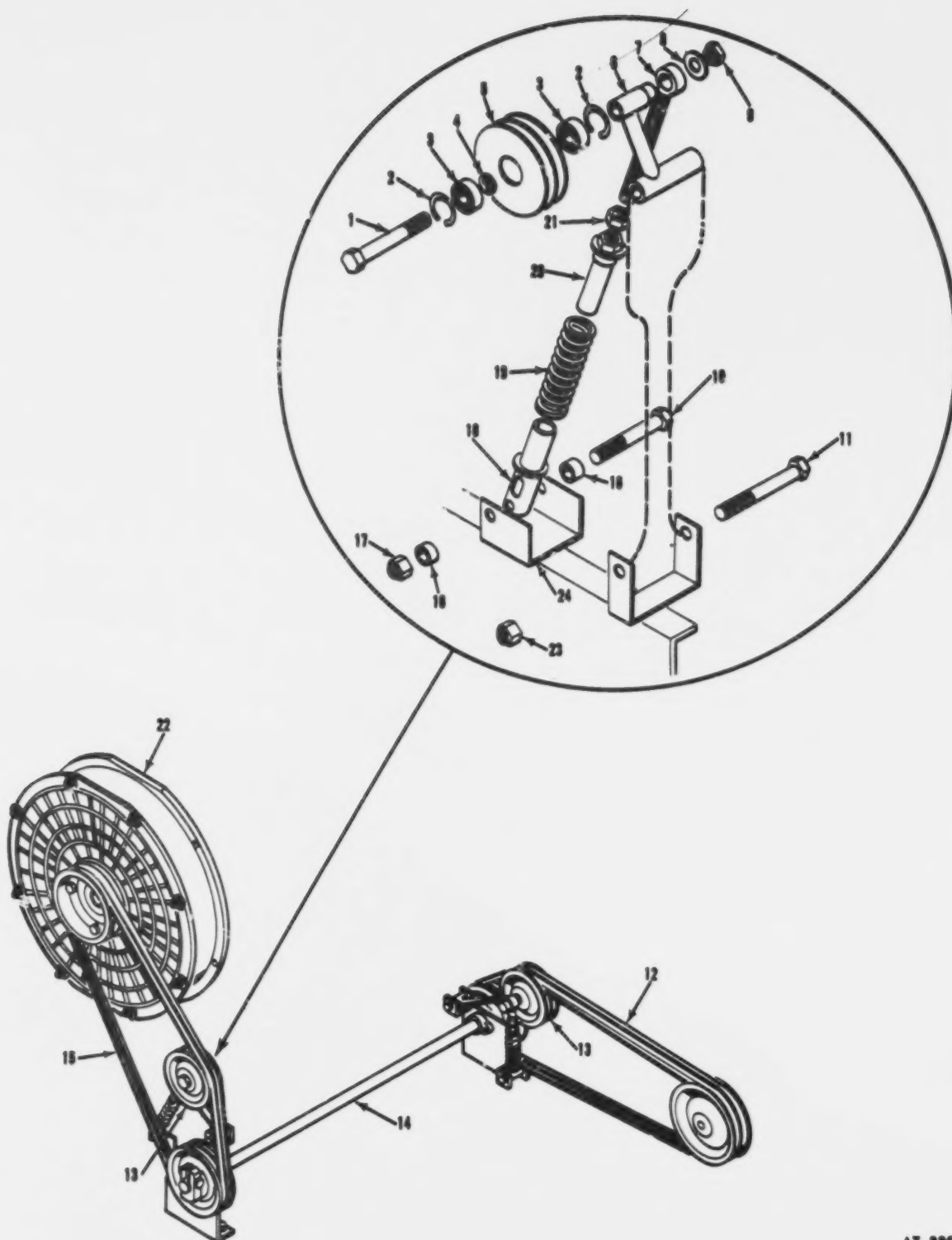


Figure 2-57. Fan adjusting linkage.

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Legend to fig. 2-57.

- | | |
|------------------------|---------------------------|
| 1 Pulley screw | 13 Idler pulley |
| 2 Retaining ring | 14 Jackshaft |
| 3 Pulley bearing | 15 Front drive-belt set |
| 4 Bearing spacer | 16 Sleeve spacer |
| 5 Drive-belt pulley | 17 Sleeve nut |
| 6 Support arm | 18 Adjusting sleeve |
| 7 Rod end | 19 Adjusting spring |
| 8 Pulley washer | 20 Adjusting nut assembly |
| 9 Pulley nut | 21 Adjusting jam nut |
| 10 Sleeve screw | 22 Fan assembly |
| 11 Support arm screw | 23 Support arm nut |
| 12 Rear drive-belt set | 24 Mounting bracket |

2-86. Coolant Tubes, Hoses and Fittings (fig. 2-58)

a. Removal.

- (1) Drain cooling system (para 2-80).
- (2) See figure 2-58 for removal of coolant tubes and hoses. Discard gaskets.

NOTE

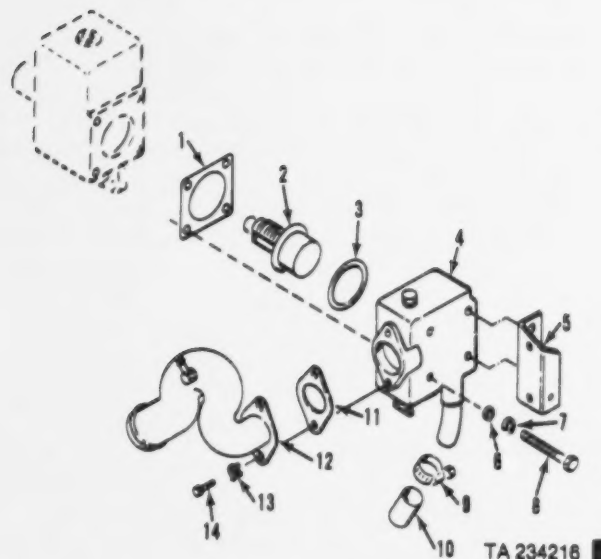
Remove only tube and hoses necessary for performance of desired maintenance operation.

b. Cleaning, Inspection, and Repair.

- (1) Inspect tubes for crushed areas and damaged ends. Replace tubes that show either of these defects.
- (2) Inspect hoses for cracks and indications of collapse. Replace hoses that show either of these defects.
- (3) Inspect clamps for cracks and excessive wear. Replace clamps that show either of these defects.
- (4) Clean metal surfaces where hoses attach.

c. Installation.

- (1) See figure 2-58 for installation of coolant tubes and hoses.
- (2) Clean external threads of screws and fittings, and apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426).
- (3) Apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to both sides of new gaskets.



- | | |
|----------------------|------------------------|
| 1 Gasket | 8 Screw (4) |
| 2 Thermostat | 9 Clamp (2) |
| 3 Seal | 10 Tube |
| 4 Thermostat housing | 11 Gasket |
| 5 Bracket | 12 Air separator elbow |
| 6 Flat washer (4) | 13 Tab washer (2) |
| 7 Lock washer (4) | 14 Screw (2) |

Figure 2-57.1. Thermostat (M730A1)

- (4) Fill cooling system (para 2-80).
- (5) Start engine, and check for leaks.

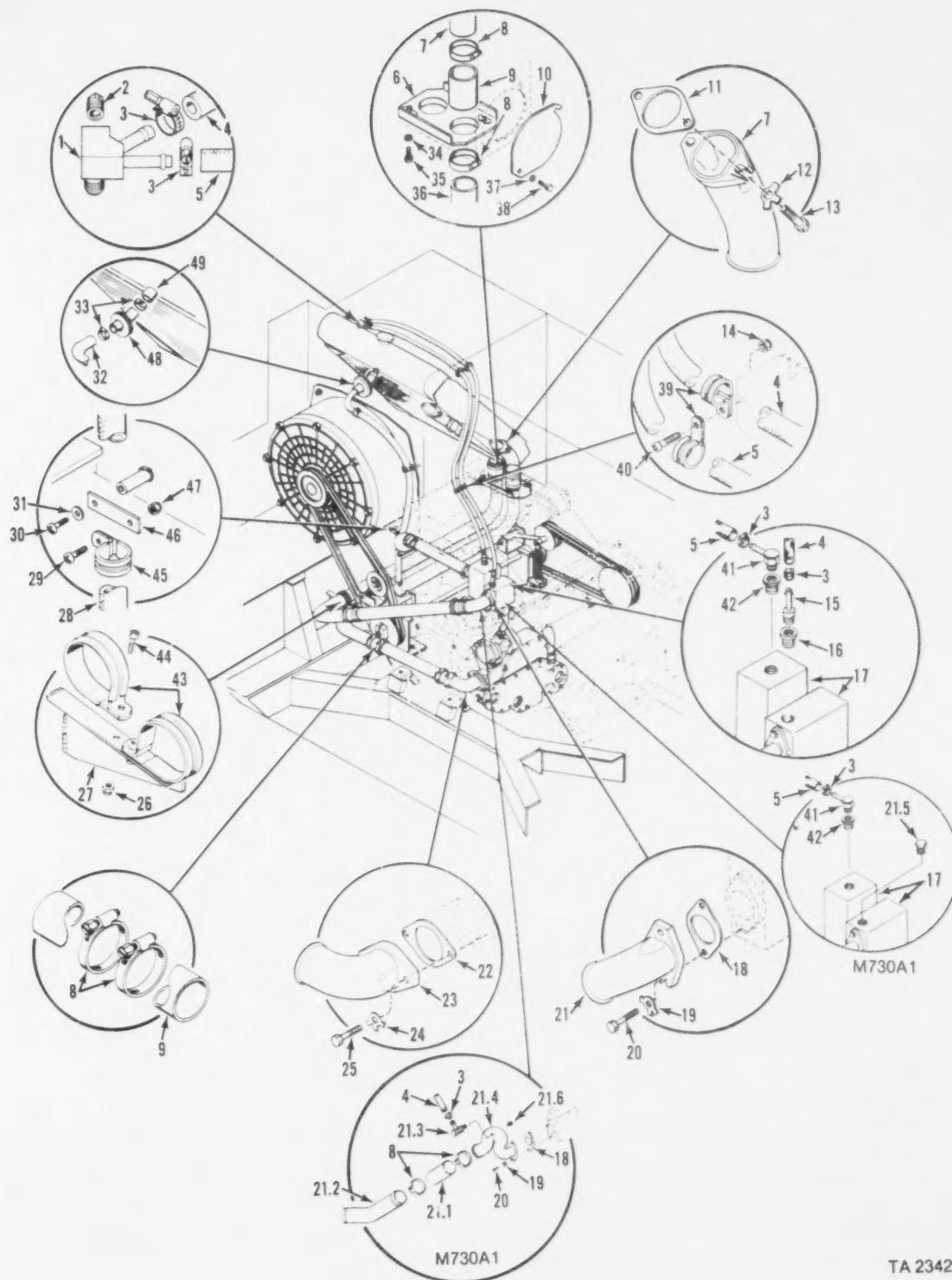


Figure 2-58. Coolant tubes, hoses, and fittings.

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Legend to fig. 2-58.

- 1 Radiator vent manifold
- 2 Manifold vent plug
- 3 Vent hose clamp
- 4 Thermostat vent hose
- 5 Engine vent hose
- 6 Coolant tube plate
- 7 Radiator outlet elbow
- 8 Coolant tube hose clamp
- 9 Coolant tube hose
- 10 Coolant tube access cover
- 11 Radiator flange gasket
- 12 Radiator flange key washer
- 13 Radiator flange screw
- 14 Vent hose cushioning clamp nut
- 15 Thermostat vent hose elbow
- 16 Thermostat vent hose adapter
- 17 Thermostat housing
- 18 Thermostat flange gasket
- 19 Thermostat flange key washer
- 20 Thermostat flange screw
- 21 Thermostat coolant outlet elbow
- 21.1 Hose (2)
- 21.2 Tube (M730A1)
- 21.3 Elbow (M730A1)
- 21.4 Air separator elbow (M730A1)
- 21.5 Plug (M730A1)
- 21.6 Plug
- 22 Oil cooler flange gasket
- 23 Oil cooler coolant inlet elbow
- 24 Oil cooler flange key washer
- 25 Oil cooler flange screw
- 26 Coolant tube mounting clamp nut
- 27 Coolant tube mounting bracket
- 28 Coolant vent hose
- 29 Coolant vent hose lamp screw
- 30 Coolant vent hose bracket screw
- 31 Coolant vent hose bracket washer
- 32 Coolant vent tube
- 33 Radiator coolant vent hose clamp
- 34 Tube plate washer
- 35 Tube plate screw
- 36 Radiator outlet tube
- 37 Access cover washer
- 38 Access cover screw
- 39 Vent hose cushioning clamp
- 40 Vent hose cushioning clamp screw
- 41 Engine vent hose elbow
- 42 Engine vent hose adapter
- 43 Coolant tube mounting clamp
- 44 Coolant tube mounting clamp screw
- 45 Coolant vent hose clamp
- 46 Coolant vent hose bracket
- 47 Coolant vent hose clamp nut
- 48 Radiator coolant vent hose grommet
- 49 Radiator coolant vent hose

2-87. Radiator and Seal

(fig. 2-59)

a. Removal.

- (1) Drain cooling system (para 2-80).
- (2) Remove exhaust grille (para 2-221).
- (3) Remove exhaust muffler (para 2-78).
- (4) Loosen two access cover screws (38, fig. 2-58) securing coolant tube access cover (10) to power plant compartment bulkhead, and rotate cover clear of access hole.

(5) Remove two coolant tubes from bottom of radiator and three vent tubes from top of radiator (para. 2-86).

(6) Remove four screws securing radiator to power plant compartment bulkhead and right side of hull, and remove radiator (fig. 2-59).

(7) Remove eight nuts and screws securing two right radiator mounts to radiator, and remove two right mounts. Remove eight nuts and screws securing two left radiator mounts to power plant compartment bulkhead, and remove two left mounts.

(8) Remove radiator inlet and outlet elbows from bottom of radiator (para 2-86).

(9) Remove radiator cap, chain, and two hooks (fig. 2-54).

(10) Remove radiator seal.

b. Cleaning. Use radiator cleaning tool (table 2-1) to remove deposits of sand, oil, clay, and other debris from the radiator fins while the radiator is installed in the carrier as follows:

(1) Connect 3/8-inch female pipe threaded connector of cleaning tool to a 100 to 150 psig air supply.

(2) A rubber hose is connected to the cleaning tool liquid supply tube for siphoning from a suitable container.

(3) Use radiator cleaning tool with water, a solution of detergent and water, or nontoxic nonflammable solvent P-C-444, Type 1 (6850-00-249-8026), and water. A solution of detergent or solvent and water is recommended. Mix 1 part detergent or solvent to approximately 5 parts of water.

CAUTION

Proper eye, skin, and clothing protection must be worn while operating the radiator cleaning tool.

(4) Remove muffler grille from top of power plant grille, open power plant door, and remove hull drain plugs.

(5) Cover all exposed openings of engine, such as air intake and exhaust.

(6) Saturate radiator fins with solution and soak for approximately 10 minutes.

(7) Remove heavy deposits from radiator by brushing with a brush that will not damage fins.

(8) Spray radiator with air/liquid mixture holding head of tool approximately 1/2 inch from radiator until a good flow of liquid through radiator is observed over entire area. Use the thumbscrew and steel grip on cleaning tool to lock the tool in any configuration required to clean all areas of the radiator.

(9) Rinse radiator and engine parts with clear water, remove hose from container, and use air to remove excess water.

(10) Uncover engine and exhaust openings.

(11) Install hull drain plug, and muffler grille.

c. Inspection and Repair.

(1) Inspect radiator for cracks, dents, and evidence of leaks. Replace radiator that shows any of these defects.

(2) Inspect radiator seal and amounts for cracks and deterioration. Replace seal and mount(s) that shows either of these defects.

(3) Inspect radiator cap for proper operation, cracks, and dents. Pressure valve should open between 13 and 18 psi pressure, and should show no evidence of leakage up to 13 psi pressure. Vacuum relief valve should open between 0 and 0.6 psi below atmospheric pressure. Replace cap that is cracked, dented, or does not operate properly.

d. Installation.

(1) Install radiator seal.

(2) Install radiator cap on radiator, and install

chain and two hooks on cap and radiator (fig. 2-54).

(3) Install radiator inlet and outlet elbows on bottom of radiator (para 2-86).

(4) Position two right radiator mounts on radiator, and secure with eight screws and nuts. Position two left radiator mounts on power plant compartment bulkhead, and secure with eight screws and nuts.

(5) Position radiator in exhaust compartment and secure to four radiator mounts with four screws.

(6) Install two coolant tubes at bottom of radiator and three vent tubes at top of radiator (para 2-86). Secure coolant tube access cover.

(7) Rotate coolant tube access cover (10, fig. 2-58) over access hole, and tighten two access cover screws (38).

(8) Install exhaust muffler (para 2-78).

(9) Install exhaust grille (para 2-221).

(10) Fill cooling system (para 2-80).

(11) Start engine (TM 9-1450-585-10), and check for leaks.

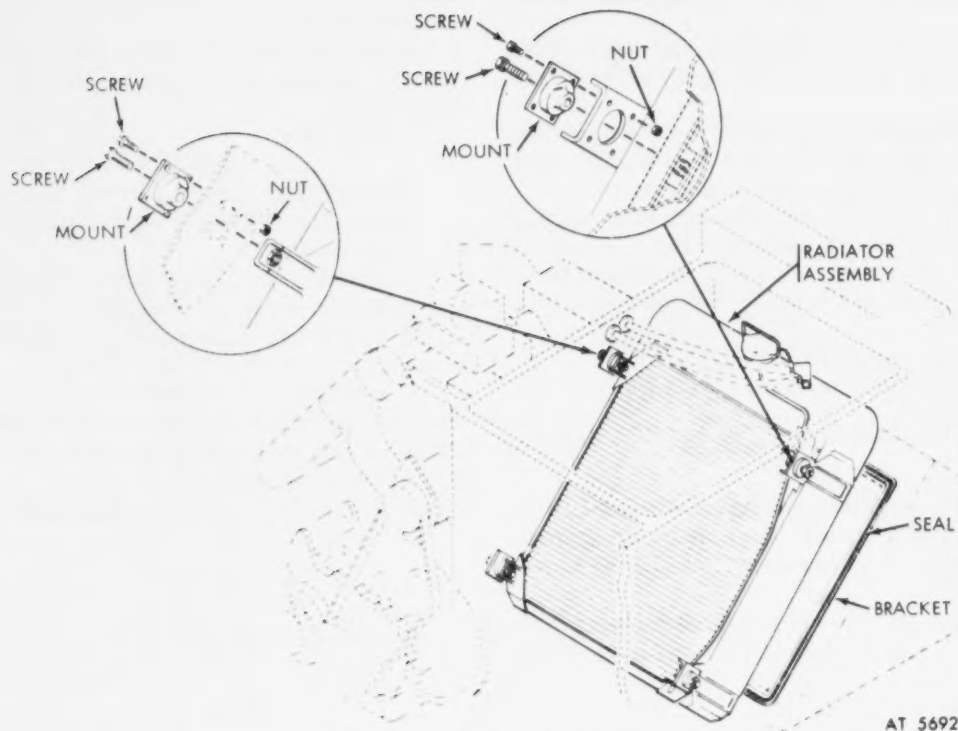


Figure 2-59. Radiator and seal.

2-88. Cooling Fan

(fig. 2-60)

a. Removal.

- (1) Remove right hand seat (para 2-229).
- (2) Remove fan drive-belts (para 2-85).
- (3) Remove three nuts (8) and washers (6) securing fan assembly (4) to screws (7). Remove fan assembly by rotating so two flat areas are on left and right sides to permit fan assembly to pass through seat opening.

NOTE

Cooling fan mounting screws are pressed into hull and are located top, bottom, and on right side.

- (4) Remove seal (5) from fan assembly. Discard seal.

- (5) If fan assembly is to be replaced, remove eight nuts (11), washers (10), and screws (9), and remove guard (3).

b. Inspection and Repair. Inspect fan assembly for visible damage. Replace fan assembly if damaged.

c. Installation.

(1) Clean surface of fan assembly (4) and mating surface of hull, remove backing from new seal (5), and with light pressure, apply seal to fan assembly.

(2) Clean threads of screws (7), and apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761).

(3) If fan assembly has been replaced, position guard (3) on fan assembly, and secure with eight screws (9), washers (10), and nuts (11).

(4) Lower fan assembly through seat opening with flat areas on left and right sides, rotate to align three mounting holes, and install on three screws (7). Secure assembly with three washers (6) and nuts (8).

(5) Install fan drive-belts (para 2-85).

(6) Install right hand seat (para 2-229).

■ **2-88.1. Fan Jackshaft Pulleys** (fig. 2-59.1)

a. Removal.

(1) Remove front and rear drive-belts (para 2-85).

(2) Loosen nut (4) and screw (6) securing front jackshaft pulley (7) to jackshaft (1), and remove pulley and key (5).

(3) Loosen nut (4) and screw (6) securing rear jackshaft pulley (2) to jackshaft (1), and remove pulley and key (5).

b. Inspection and Repair.

(1) Inspect jackshaft pulleys for dents, cracks, nicks, distortion, and excessive wear. Replace pulley that shows any of these defects.

(2) Inspect key for burred or chipped condition. Replace key that shows either of these defects.

(3) Inspect jackshaft end for excessive wear. Notify direct support maintenance personnel if this condition exists.

(4) Inspect threaded parts for distortion and damaged threads. Replace parts that show either of these defects.

c. Installation.

CAUTION

The M730A1 pulleys are not the same.

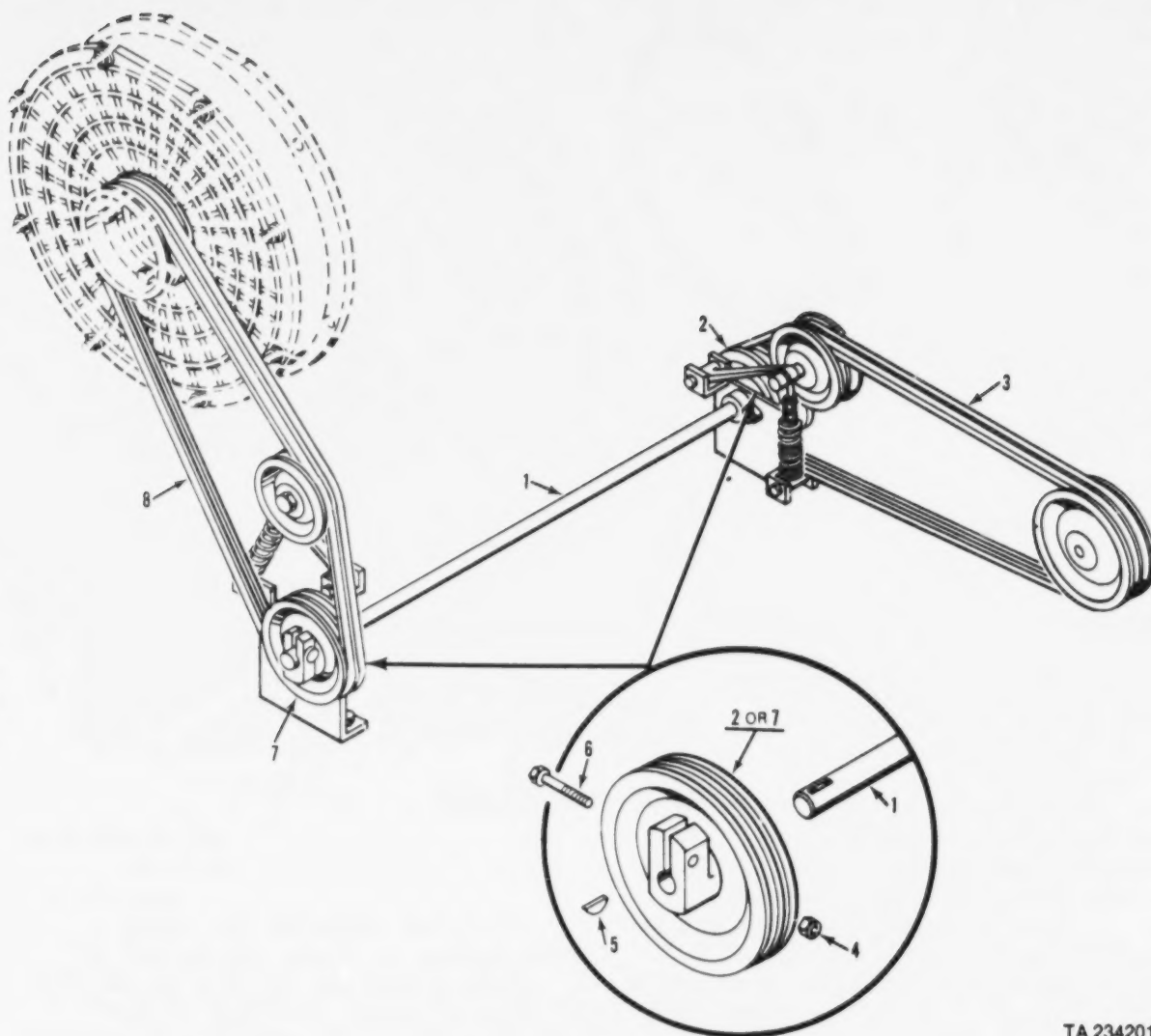
Rear pulley (2) has a smaller diameter than front pulley (7).

(1) Install key (5) in jackshaft (1), and position rear jackshaft pulley (2) on jackshaft.

(2) Install key (5) in jackshaft (1), and position front jackshaft pulley (7) on jackshaft.

(3) Position fan drive-belts (3 and 8) on pulleys, align jackshaft pulleys (2 and 7) with mating pulleys within 1/8 inch, and tighten screws (6) and nuts (4) to secure pulleys on jackshaft (1).

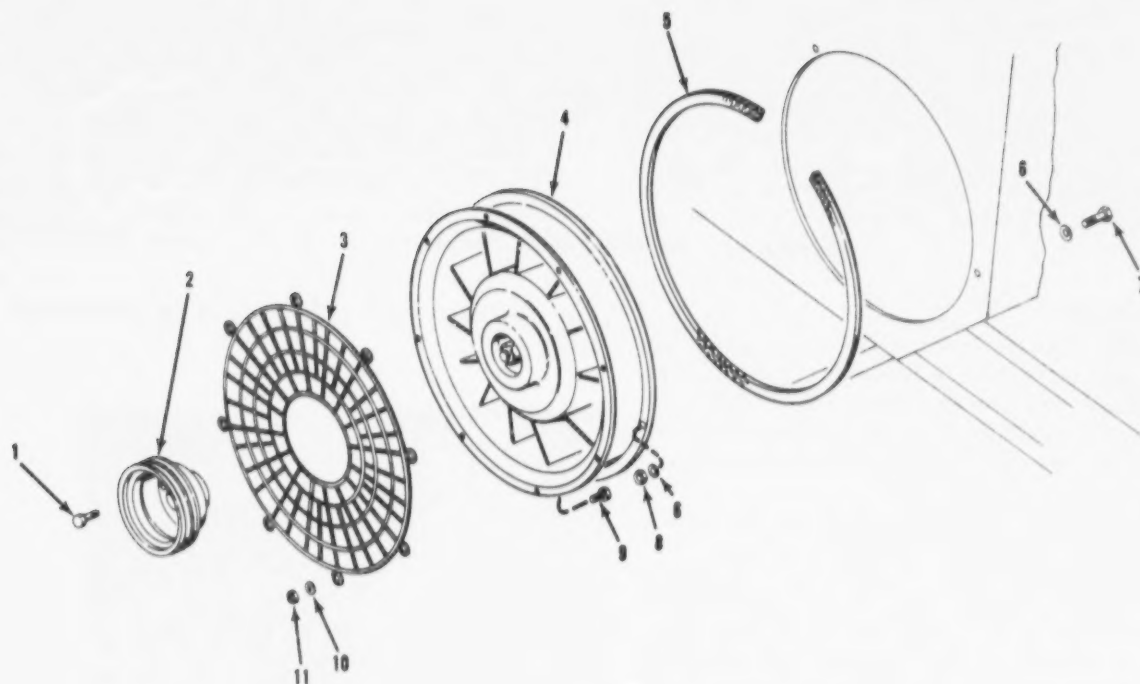
(4) Adjust fan drive-belts (para 2-85).



TA 234201

- | | |
|--|---|
| 1 Jackshaft | 5 Key (2) |
| 2 Rear pulley (M730A1, 5.681 inch dia) | 6 Screw (2) |
| 3 Rear drive belts | 7 Front pulley (M730A1, 6.331 inch dia) |
| 4 Nut (2) | 8 Front drive belts |

Figure 2-59.1. Fan drive and jackshaft pulleys.



ORD E62308

1 Pulley screw
2 Fan pulley
3 Fan guard
4 Fan assembly

5 Fan seal
6 Fan retaining washer
7 Fan retaining screw

8 Fan retaining nut
9 Guard screw
10 Guard washer
11 Guard nut

Figure 2-60. Cooling fan and pulley.

2-89. Fan Pulley

(fig. 2-60)

a. Removal.

- (1) Remove fan drive-belts (para 2-85).
- (2) Remove four screws (1) securing pulley (2) to fan assembly (4), and remove pulley.

b. Inspection and Repair. Inspect fan pulley for bent or cracked condition. Replace fan pulley that shows either of these defects.

c. Installation.

- (1) Clean threads of screws (1), and apply a light coat of antiseize compound MIL-A-907.
- (2) Position pulley (2) on fan assembly (4), align four mounting holes, and secure pulley to fan assembly with four screws (1).
- (3) Install fan drive-belts (para 2-85).

2-90. Fan Adjusting Linkage

(fig. 2-57)

a. Removal and Disassembly.**NOTE**

The following procedure applies to both front and rear adjusting linkages.

- (1) Remove fan drive-belts (para 2-85).

- (2) Remove nut (9), washer (8), and screw (1) securing pulley (5) and rod end (7) to arm (6).

- (3) Remove rod end (7), jam nut (21), nut assembly (20), and spring (19).

- (4) Remove nut (17), two spacers (16), and screw (10) securing sleeve (18) to bracket (24), and remove sleeve.

- (5) Loosen jam nut (21), and remove nut assembly (20) and jam nut (21) from rod end (7).

- (6) Remove nut (23) and screw (11), and remove arm (6) from bracket.

b. Inspection and Repair.

- (1) Inspect threaded parts for damaged threads and worn condition. Replace parts that show either of these defects.

- (2) Inspect spring for loss of tension and broken condition. Replace spring that shows either of these defects.

- (3) Inspect sleeve for cracks, nicks, and worn condition. Replace sleeve that shows any of these defects.

c. Assembly and Installation.

NOTE

The following procedure applies to both front and rear adjusting linkages.

- (1) Position arm (6) on bracket, and secure with screw (11) and nut (23).
- (2) Install nut assembly (20) and jam nut (21) on rod end (7).
- (3) Position sleeve (18) on bracket (24), and

secure with screw (10), two spacers (16), and nut (17).

(4) Position spring (19), nut assembly (20), jam nut (21), and rod end (7) to arm (6). Install screw (11), pulley (5), washer (8), and nut (9). Tighten nut to 50 to 55 pound-feet torque.

- (5) Install fan drive-belts (para 2-85).
- (6) Adjust fan drive-belts (para 2-85).

Section XI. INSTRUMENT PANEL**2-91. General**

a. Scope. This section contains instructions for partial removal and installation of the instrument panel; and instruction for removal, inspection and repair, and installation of the instrument panel circuit breaker and panel indicator lights and lamps.

b. Description. The instrument panel, shock mounted at top and bottom, contains the speedometer and tachometer; the battery-generator, fuel quantity, and coolant temperature indicators; the starter, horn, air box heater, bilge pumps, windshield wiper, fuel pump, infrared-blackout selector, and light selector switches; the headlight hi-beam, aft bilge pump, forward bilge pump, and master switch indicator lights; the differential oil high temperature, transmission oil high temperature, engine oil low pressure warning lights; and the instrument panel lights. The instrument panel can be partially removed to service these components.

2-92. Instrument Panel

(fig. 2-61)

a. Partial Removal.

- (1) Remove four screws and washers securing instrument panel to mounts.
- (2) Remove fuel cutoff control (para 2-212) and throttle control (para 2-210) from instrument panel.
- (3) Disconnect speedometer flexible shaft from speedometer (para 2-257).
- (4) Pull panel forward to gain access to backside of panel for disconnecting circuit leads and removing components.

CAUTION

Do not disconnect more than one instrument or indicator light at a time.

b. Installation.

- (1) Connect speedometer flexible shaft to speedometer (para 2-257).
- (2) Position instrument panel on mounts, and secure with four screws and washers.
- (3) Install fuel cutoff control (para 2-212)

and throttle control (para 2-210) on instrument panel.

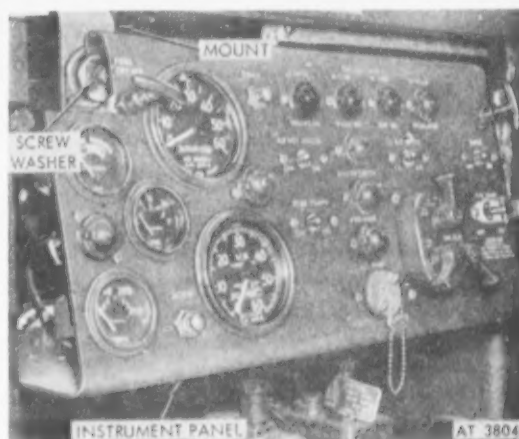


Figure 2-61. Instrument panel.

2-93. Panel and Indicator Lights

(fig. 2-62)

*a. Removal.***NOTE**

The panel and indicator lights are either two-lead connector type or one-lead connector type. Except for the number of lead connectors, the procedure for removing and installing panel or indicator lights is similar. The following procedure is typical for all lights mounted on the instrument panel.

NOTE

Make certain master switch is OFF.

- (1) Partially remove instrument panel (para 2-92).
- (2) Disconnect appropriate lead(s) from light to be removed.
- (3) Turn lens (2) counterclockwise, and remove lens and gasket (3).
- (4) Remove two screws (1) and washers (19) securing light body (5 or 20) to instrument panel (7), and remove light body.

NOTE

Circuit lead(s) connected to specific lights are: 519 and 519A to high beam indicator light, 328 and 27K to differential oil high temperature warning light, 327 and 27G to transmission oil high temperature warning light, 34 and 27J to engine oil low pressure warning light, 27D to master switch on indicator light, 452 to front bilge pump indicator light, 451 to rear bilge pump

indicator light, 40 to both panel lights.

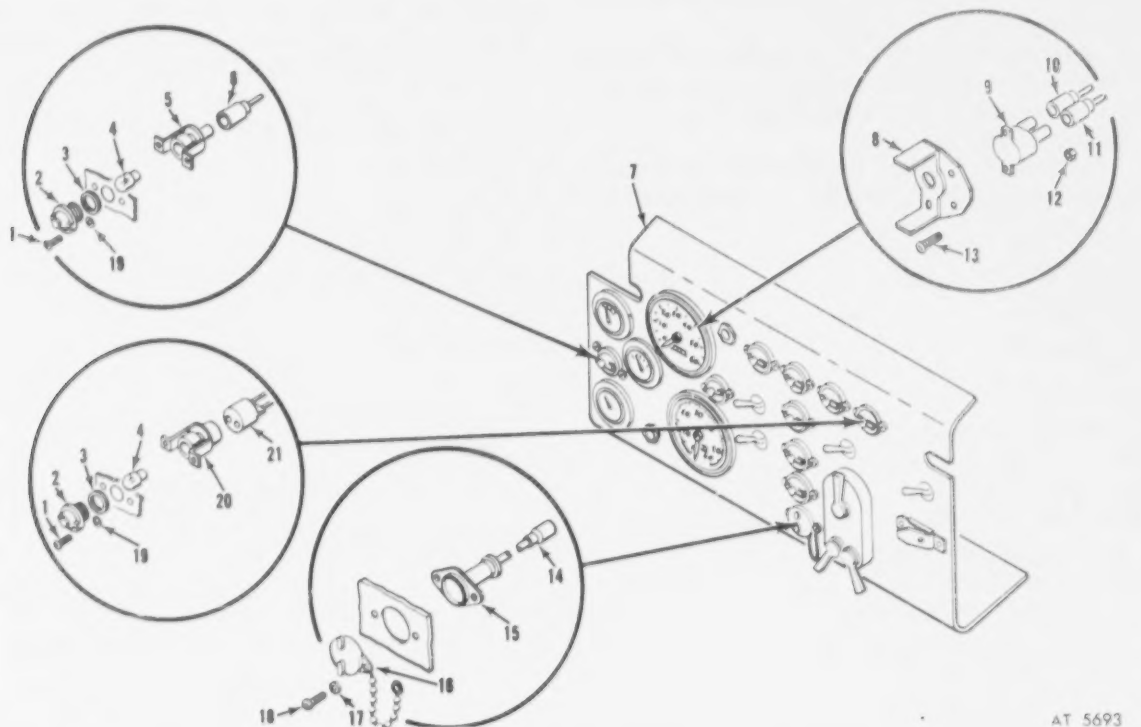
b. Installation.

(1) Position light body (5 or 20) in panel (7), and secure with two screws (1) and washers (19).

(2) Install gasket (3) and lens (2) on light body (5 or 20), and secure by turning lens clockwise.

(3) Connect appropriate lead(s) to light.

(4) Install instrument panel (para 2-92).



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- | | | |
|---|---------------------------|--|
| 1 Light screw | 8 Circuit breaker bracket | 15 Utility outlet receptacle |
| 2 Light lens | 9 Circuit breaker | 16 Receptacle cover and chain |
| 3 Lens gasket | 10 Circuit 10 lead | 17 Receptacle washer |
| 4 Light lamp | 11 Circuit 27 lead | 18 Receptacle screw |
| 5 Light body (single connector) | 12 Circuit breaker nut | 19 Light washer |
| 6 Light circuit lead (single connector) | 13 Circuit breaker screw | 20 Light body (dual connector) |
| 7 Instrument panel assembly | 14 Circuit 37 lead | 21 Light circuit lead (dual connector) |

Figure 2-62. Instrument panel lights, lamps, circuit breaker, and utility outlet receptacle.

2-94. Panel and Indicator Lamps

(fig. 2-62)

NOTE

The procedure for removing and installing lamps in all instrument panel lights is similar. The following procedure is typical for all panel lamps.

a. Removal.**NOTE**

Make certain master switch is OFF.

(1) Turn light lens (2) counterclockwise, and remove lens.

(2) Depress and turn lamp (4) counterclockwise, and remove from light body (5 or 20).

b. Installation.

(1) Position lamp (4) in light body (5 or 20), depress and turn lamp clockwise to secure.

(2) Position lens (2) on lamp body, and secure by turning clockwise.

2-95. Instrument Panel Circuit Breaker
(fig. 2-62)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 10 lead (10) and circuit 27 lead (11) from circuit breaker (9).

(3) Remove two nuts (12) and screws (13) securing circuit breaker (9) to circuit breaker (8), and remove circuit breaker.

b. Inspection and Repair. Check circuit breaker as described in electrical troubleshooting (para 2-23). Replace circuit breaker if defective.

c. Installation.

(1) Position circuit breaker (9) on bracket (8), and secure with two screws (13) and nuts (12).

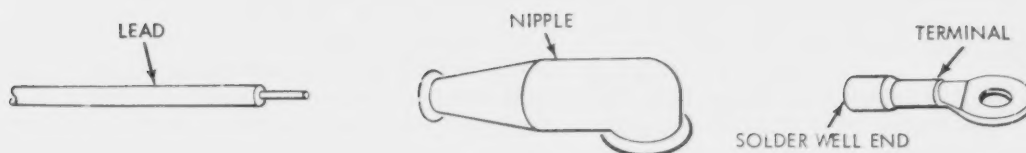
(2) Connect circuit 10 lead (10) and circuit 27 lead (11) to circuit breaker (9).

(3) Install instrument panel (para 2-92).

2-96. Instrument Panel Wiring Harness
(fig. 2-63)

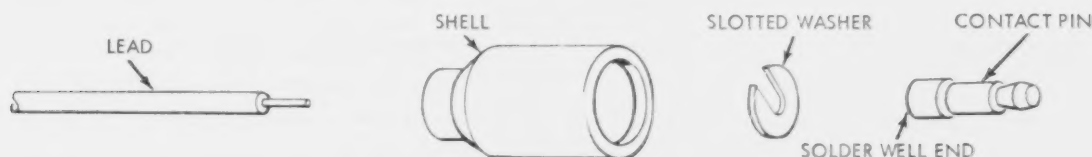
a. General. Repair of the instrument panel wiring harness is limited to replacing connectors and terminals on harness or lead ends.

b. Inspection and Repair. Examine harness for frayed, broken, or cracked insulation. If harness shows any of these defects, notify direct support maintenance personnel. Check for damaged connectors or terminals. Replace connectors and terminals that show damage. See figure 2-63 for repairing instrument panel wiring harness.



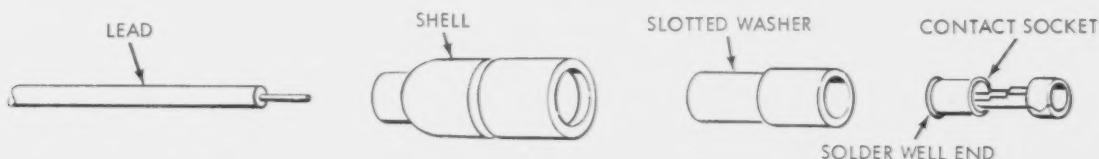
A-TERMINAL-TYPE LEAD CONNECTOR

- 1-STRIP LEAD INSULATION EQUAL TO DEPTH OF SOLDER WELL IN TERMINAL.
- 2-SLIDE NIPPLE OVER LEAD.
- 3-INSERT LEAD INTO TERMINAL, AND SOLDER.
- 4-SLIDE NIPPLE OVER CRIMPED END OF TERMINAL.



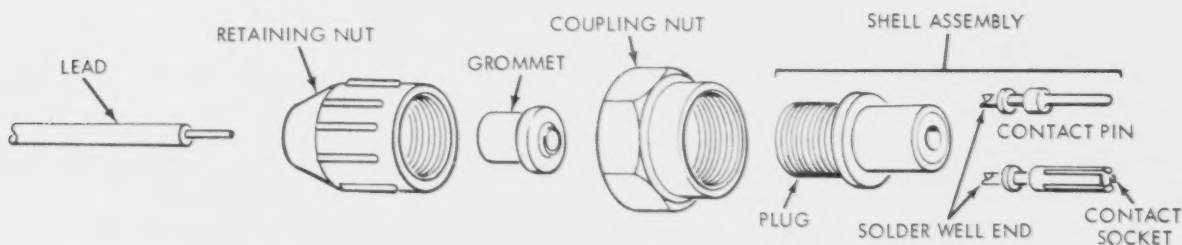
B-MALE LEAD CONNECTOR WITH WASHER

- 1-STRIP LEAD INSULATION EQUAL TO DEPTH OF SOLDER WELL IN PIN.
- 2-SLIDE SHELL OVER LEAD.
- 3-INSERT LEAD INTO PIN, AND SOLDER.
- 4-SLIDE WASHER ON PIN, AND PULL SHELL OVER WASHER AND PIN.



C-FEMALE LEAD CONNECTOR

- 1-STRIP LEAD INSULATION EQUAL TO DEPTH OF SOLDER WELL IN SOCKET.
- 2-SLIDE SHELL AND SLEEVE OVER LEAD.
- 3-INSERT LEAD INTO SOCKET, AND SOLDER.
- 4-SLIDE SHELL AND SLEEVE OVER SOCKET.



D-FEMALE OR MALE TYPE CONNECTOR ASSEMBLY

- 1-STRIP LEAD INSULATION EQUAL TO DEPTH OF SOLDER WELL IN PIN OR SOCKET.
- 2-SLIDE RETAINING NUT AND GROMMET OVER LEAD.
- 3-INSERT LEAD INTO PIN OR SOCKET, AND SOLDER.
- 4-POSITION COUPLING NUT ON RETAINING NUT.
- 5-PRESS PLUG OVER PIN OR SOCKET, AND THREAD PLUG INTO RETAINING NUT.

AT 3805

Figure 2-63. Repairing instrument panel wiring harness.

Section XII. BATTERY AND GENERATING SYSTEM

2-97. General

a. *Scope.* This section contains instructions for removal, test, adjustment, inspection and repair, disassembly and assembly, and installation of the battery and generating system.

b. *Description.* The 24-volt battery and generating system consists of two 12-volt batteries, generator, generator-regulator, rectifier carriers

after C-143 have a generator-alternator-rectifier unit), master switch on indicator light, and instrument panel and regulator circuit breakers. See figure 1-8 for electrical schematic of the battery and generating system.

c. *Torque Wrench Specifications.* Refer to table 2-16 for torque tightness readings.

Table 2-16. Battery and Generating System Torque Wrench Specifications

Fig. No.	Key No.	Location	Pound-feet torque
2-64	—	Battery center clamp bolt	3-10
2-64	—	Battery end clamp nut	3-10
2-66	2	Battery frame-to-hull mounting screw	20-24
2-66	3	Battery frame channel screw	20-25
2-68	—	Generator pulley retaining nut	70-75

2-98. Batteries

a. *Service.*

(1) *Testing specific gravity.* The specific gravity of the electrolyte indicates the state of charge in each battery cell. Use a hydrometer and thermometer to determine specific gravity. The specific gravity at full charge should be 1.285 at 80°F.

(2) *Correcting specific gravity.* The state of battery charge when the electrolyte is not at 80°F is determined as follows: Correct specific gravity reading plus or minus ($\pm$) 4 points (0.004) for each 10°F change of temperature above or below 80°F. For example, if specific gravity reading is 1.280 at 0°F, subtract 32 points (0.032), which gives a corrected reading of 1.248. A specific gravity reading of 1.225 or less in each cell indicates that the battery must be recharged or replaced. If readings for all cells are even and below 1.225, recharge battery. If readings differ by more than 25 points (0.025), replace battery.

(3) *Adding water.* The water in the electrolyte solution evaporates because of high temperature or excessive charging rates. Inspect battery and add distilled water or rain water at intervals required by service and climatic conditions. Keep batteries filled with water to split ring level.

CAUTION

Keep batteries clean, and do not overfill. In cold weather, charge battery immediately after adding water so water will combine with electrolyte and not freeze.

(4) *Placing dry-charged batteries into service.* Batteries shipped charged and dry must be filled

with electrolyte. Every effort should be made to give a battery an initial charge up to full charge before putting the battery in service. Instructions will generally be received with the batteries as to the necessary amount and specific gravity of the electrolyte, and the rate and time of initial charge the batteries should receive. In general, the instructions in (a) through (c) below apply.

(a) Remove sealing devices from vent plugs and destroy. Do not remove plugs until ready to fill the batteries.

(b) Fill each cell with electrolyte to $\frac{3}{8}$ inch above separators. In temperate climates, use electrolyte of 1.280 specific gravity; temperature of the battery and electrolyte must be above 60°F., but preferably not above 100°F. After 10 minutes, add electrolyte again to replace that absorbed by plates and separators.

(c) If the battery, now ready for use, will not be used within 12 hours after filling, allow battery to cool to atmospheric temperature, then charge battery. The charging rate for new batteries should never exceed 1 ampere per positive plate, per cell. Watch temperature closely; if it exceeds 100°F., reduce rate at once. Continue charge until three hydrometer readings at half hour intervals show no further rise in specific gravity.

NOTE

Stamp service date on newly prepared battery as instructed in TM 9-6140-200-14.

(5) *Cleaning battery.* The top of the battery must be kept clean. Tighten vent plugs, and clean batteries with brush dipped in alkaline solution of

bicarbonate of soda and water. After foaming stops, flush top of battery with clean water, and wipe dry with cloth. Clean cable terminals and clamps in same manner. Connect and tighten cable clamps, and coat cable terminals with grease. Refer to TM 9-6140-200-14 for additional information on batteries.

WARNING

Do not allow battery electrolyte to contact flesh; severe burns will develop.

b. Removal (fig. 2-64).

NOTE

Make certain master switch is OFF.

(1) Unlock driver's seat clamp, and swing seat forward to expose battery compartment.

(2) Loosen screw and nut, and separate circuit 7 lead from negative (—) post.

(3) Loosen screw and nut, and separate circuit 6 lead from positive (+) post.

(4) Loosen nut and screw, and separate jumper lead from post.

(5) Loosen two nuts on end clamp bolts, and separate end clamps from batteries.

(6) Loosen center clamp bolt, and rotate center clamp 90°.

(7) If battery retainer kit (fig. 2-65) has been installed, loosen center bolt and two end nuts, rotate center clamp to release two retainers, and rotate retainers to clear batteries.

(8) Lift out both batteries

NOTE

Front battery must be removed first in order to remove rear battery.

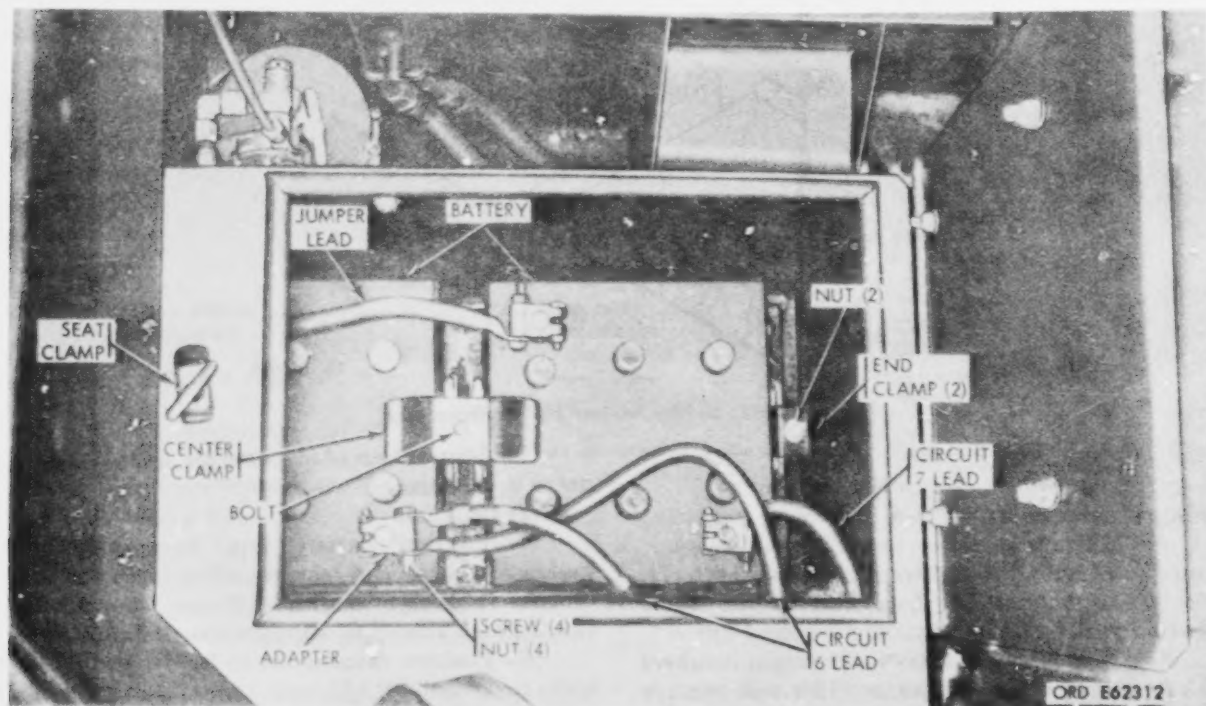


Figure 2-64. Batteries.

c. Installation.

(1) Position two batteries in battery box.

NOTE

Rear battery must be installed first.

(2) Position center clamp on both batteries, and secure with center clamp bolt. Tighten bolt to 8 to 10 pound-feet torque.

(3) Position end clamps on batteries, and secure with two bolts and nuts.

(4) If batteries have plastic or rope handles, or metal handles are damaged, install battery retainer kit (fig. 2-65) as follows:

(a) Discard existing center retainer and two existing end clamps.

(b) Position kit retainer over each battery and on each end bolt.

(c) Install kit clamp and kit flat washer over two kit retainers at center, and install center bolt.

(d) Install two nuts and two kit flat washers to secure ends of two kit retainers and batteries.

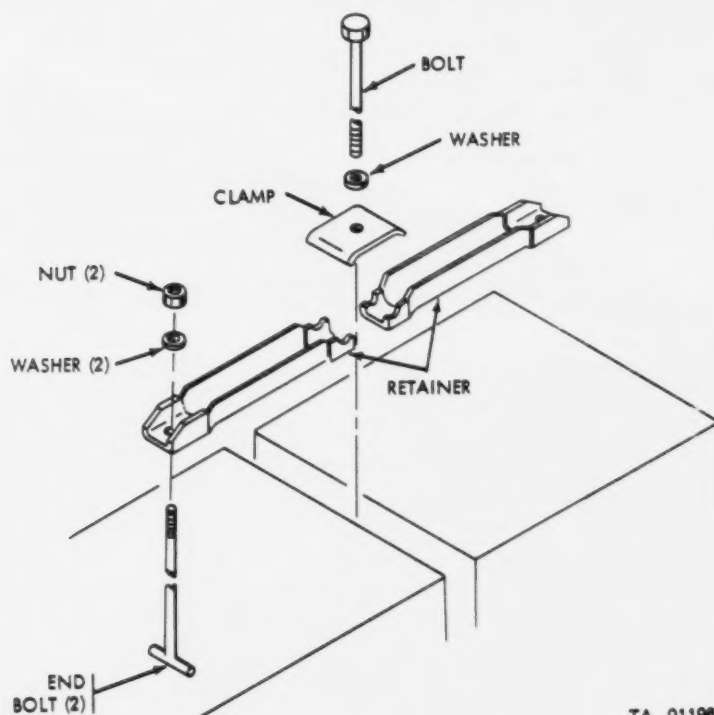
(e) Tighten center bolt and two end clamp nuts to 8 to 10 pound-feet torque.

(5) Install jumper lead on post, and secure with screw and nut.

(6) Install circuit 6 lead on positive (+) post, and secure with screw and nut.

(7) Install circuit 7 lead on negative (—) post, and secure with screw and nut.

(8) Position driver's seat on battery compartment, and secure with seat clamp.



TA 011966

Figure 2-65. Battery retainer kit—exploded view.

2-99. Battery Box Frame (fig. 2-66)

a. Removal.

(1) Remove batteries (para 2-98).
(2) Remove two screws (8) and washers (7), and remove channel (6) from battery box frame (11).

(3) Remove four screws (2), eight washers (1), and four resilient mounts (13), and remove frame from bulkhead (12).

b. Inspection and Repair.

(1) Inspect frame for weld breaks, cracks, and distortions. Replace frame if defect cannot be repaired.

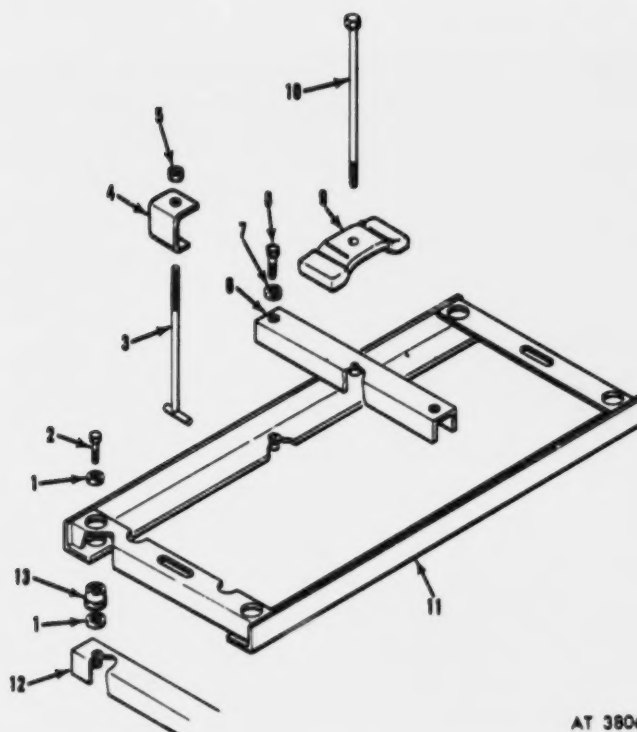
(2) Inspect threaded parts for burs. Replace parts if defective.

c. Installation.

(1) Position battery box frame (11) to bulkhead (12), and secure with four resilient mounts (13), eight washers (1), and four screws (2). Tighten screws to 20 to 24 pound-feet torque.

(2) Position channel (6) to frame, and secure with two washers (7) and screws (8). Tighten screws to 20 to 25 pound-feet torque.

(3) Install batteries (para 2-98).



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- 1 Frame washer
- 2 Frame screw
- 3 End clamp bolt
- 4 Battery end clamp

- 5 Clamp nut
- 6 Frame channel
- 7 Channel washer
- 8 Channel screw
- 9 Battery center clamp

- 10 Center clamp bolt
- 11 Battery box frame
- 12 Bulkhead
- 13 Resilient mount

Figure 2-66. Battery box frame.

2-100. Auxiliary Power Receptacle (fig. 2-67)

a. Removal.

- (1) Unlock driver's seat clamp, and swing seat forward to expose battery compartment.
- (2) Disconnect battery negative lead (para 2-98).
- (3) Disconnect receptacle ground lead from master switch by removing nut.
- (4) Disconnect receptacle circuit 49 lead from bus bar by removing screw and nut.
- (5) Remove four screws and nuts securing receptacle to bulkhead, and remove receptacle.

b. Inspection and Repair.

- (1) Inspect receptacle for frayed, broken, or cracked insulation. Replace receptacle that shows any of these defects.

- (2) Inspect receptacle for burned contacts. Replace receptacle that shows burned contacts.

c. Installation.

- (1) Position receptacle in battery compartment bulkhead with keyway in slave cable receptacle up.

- (2) Secure receptacle to bulkhead with four screws and nuts.

- (3) Connect receptacle circuit 49 lead to bus bar, and secure with screw and nut.

- (4) Connect receptacle ground lead to master switch, and secure with nut.

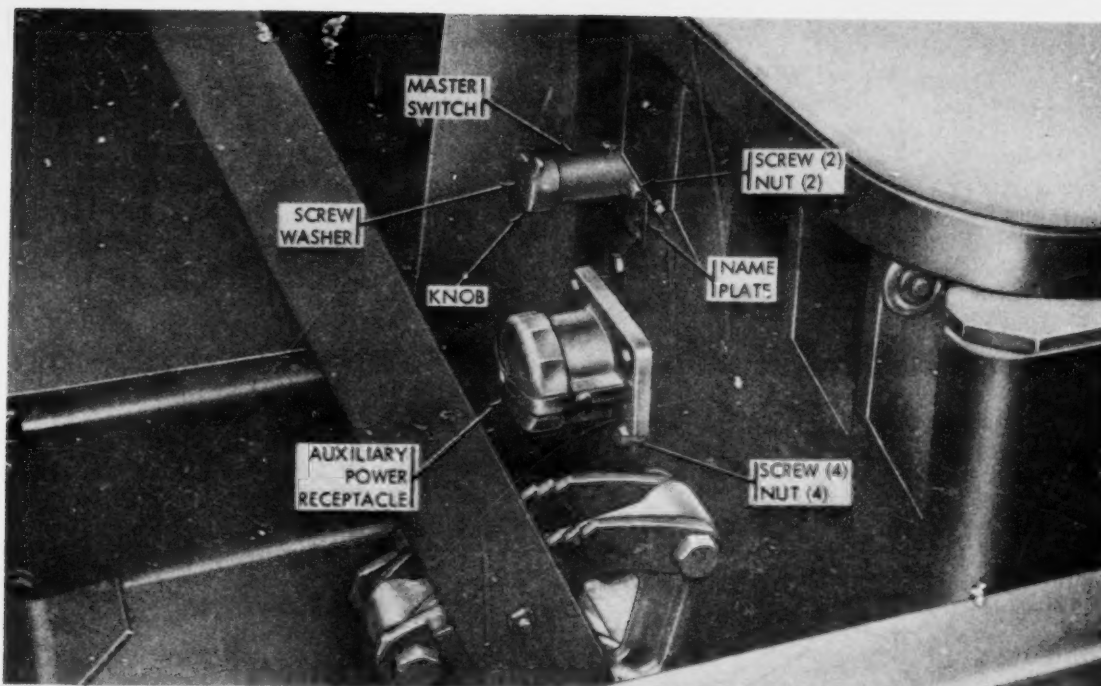
- (5) Connect battery negative lead (para 2-98).

- (6) Lower driver's seat down on battery compartment, and secure with clamp.

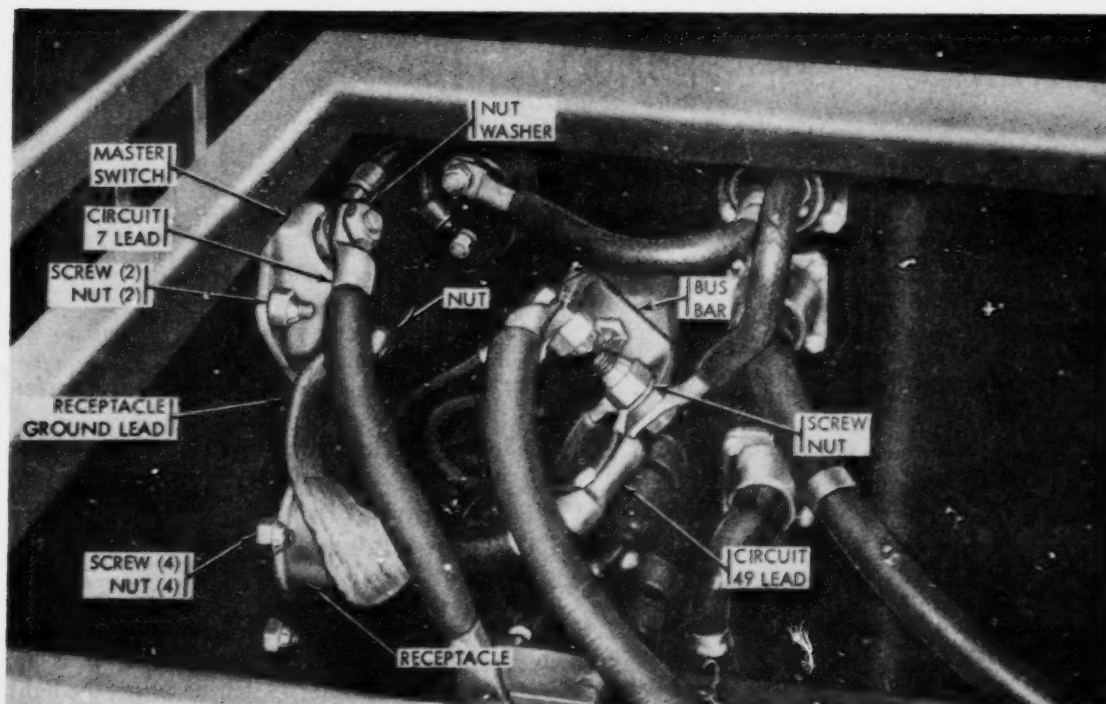
2-101. Master Switch On Indicator Light (fig. 2-62)

- ### a. Removal.
- Refer to paragraph 2-93 for removal of the master switch on indicator light.

- ### b. Installation.
- Refer to paragraph 2-93 for installation of the master switch on indicator light.



A—MASTER SWITCH, SWITCH KNOB, AND AUXILIARY POWER RECEPTACLE



B—SWITCH, RECEPTACLE, CIRCUIT LEADS, SCREWS, AND NUTS

ORD E62313

Figure 2-67. Auxiliary power receptacle and master switch.

2-102. Master Switch

(fig. 2-67)

a. Removal.

(1) Unlock driver's seat clamp, and swing seat forward to expose battery compartment.

(2) Disconnect circuit 7 lead from battery (para 2-98). Position or tape disconnected lead so it cannot make contact with battery.

(3) Disconnect master switch ground lead from back of master switch by removing nut. Reinstall nut on switch.

(4) Disconnect circuit 3 and 7 leads from back of master switch by removing nut and washer. Reinstall washer and nut on switch.

(5) Remove cap screw and washer securing switch knob to switch, and remove knob.

(6) Remove two cap screws and nuts securing name plate and switch to bulkhead.

(7) Remove name plate on driver's side of bulkhead, and master switch from battery compartment.

b. Inspection and Repair. Check switch as described in electrical troubleshooting (para 2-21). Replace switch if defective.

c. Installation.

(1) Position name plate and master switch on bulkhead, and secure in place with two cap screws and nuts.

(2) Install switch knob on switch, and secure with washer and cap screw.

(3) Connect circuit 7 and 3 leads to back of master switch with washer and nut.

(4) Connect master switch ground lead to back of master switch with nut.

(5) Connect circuit 7 lead from switch to battery negative post (para 2-98).

(6) Lower driver's seat down on battery compartment, and secure with clamp.

2-103. Generator

(fig. 2-68)

a. Removal.

(1) Remove generator drive-belts (para 2-106).

(2) Disconnect electrical cable from generator.

(3) Remove three screws and nuts securing generator with pulley to mount.

(4) Remove generator with pulley from mount.

(5) If replacement generator is to be installed, remove pulley from generator by removing nut, washer, and key. Reinstall nut and washer on generator.

NOTE

If replacement generator is the late model generator 10947517, a separate rectifier is not required. Remove and dispose of rectifier and wiring harness as instructed

in paragraph 2-107d.

b. Inspection and Repair. Check generator as described in electrical troubleshooting (para 2-21). Replace generator if defective.

c. Installation.

(1) If installing replacement generator, remove nut and washer from new generator. Install key, pulley, washer, and nut in that sequence on generator shaft. Tighten nut to 70 to 75 pound-feet torque.

(2) Position generator with pulley on mount, and secure with three screws and nuts.

NOTE

To prevent damage to generator, fill any gap between generator mounting lugs and bracket mounting lugs with shim washers before tightening screws and nuts.

(3) Connect electrical cable to generator.

NOTE

If late model generator has been installed, use wiring harness 11589465-4 and connect as shown in figure 2-4 (back of book).

(4) Install and adjust drive-belts (para 2-106).

2-104. Generator Mount

(fig. 2-68)

a. Removal.

(1) Remove generator drive-belts (para 2-106).

(2) Remove generator drive-belt adjusting linkage (para 2-105).

(3) Remove generator (para 2-103).

(4) Remove three screws and washers securing generator mount to engine, and remove generator mount.

b. Inspection and Repair. Inspect generator mount for cracks and distortion. Replace mount that shows either of these defects.

c. Installation.

(1) Position generator mount on engine, and secure with three screws and washers.

(2) Install generator (para 2-103).

(3) Install generator drive-belt adjusting linkage (para 2-105).

(4) Install and adjust generator drive-belts (para 2-106).

2-105. Generator Drive-Belt Adjusting Linkage

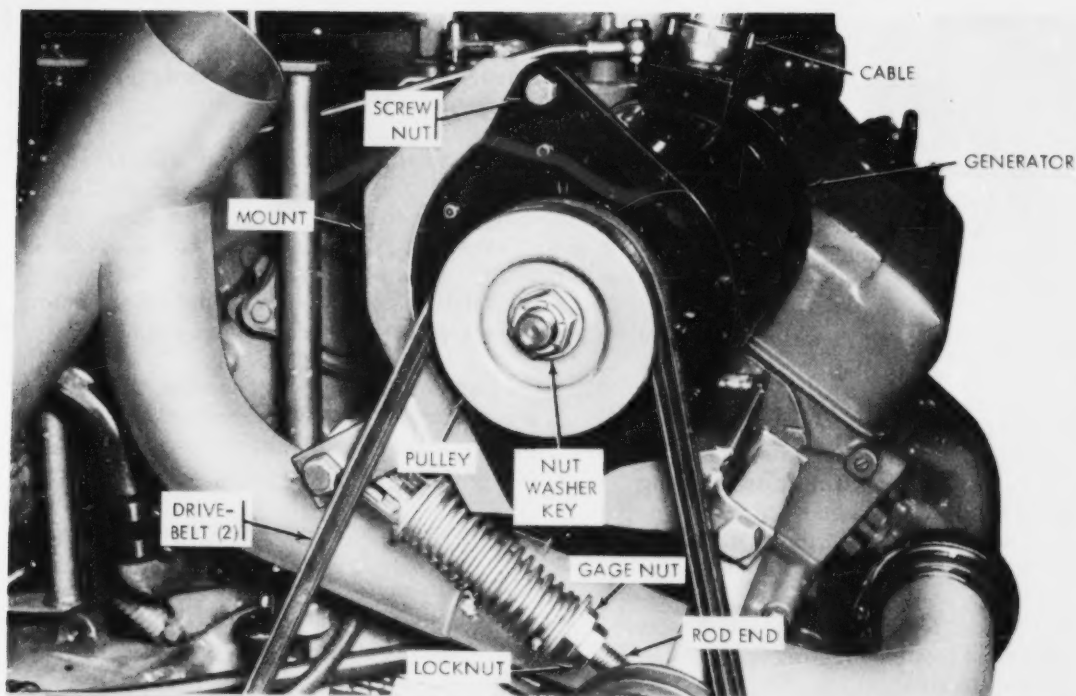
(fig. 2-68)

a. Removal.

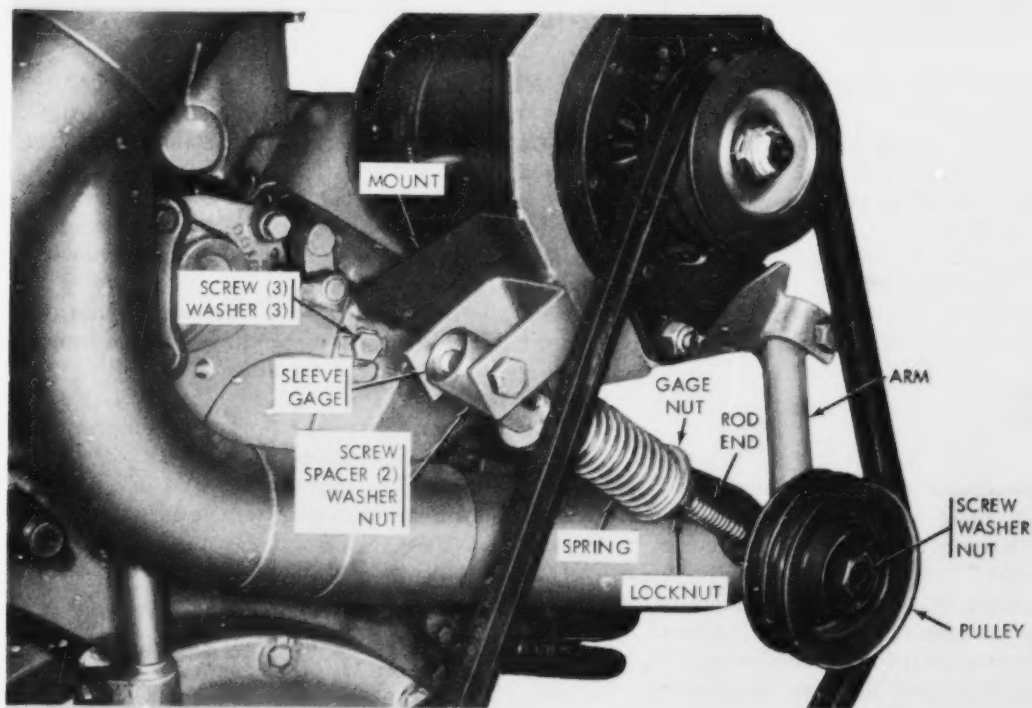
(1) Remove generator drive-belts (para 2-106).

(2) Remove screw, nut, washer, and spacers securing linkage to generator mount bracket.

(3) Remove screw, washer, and nut securing



A-GENERATOR AND GENERATOR DRIVE-BELTS



B-GENERATOR ADJUSTING LINKAGE

AT 5694

Figure 2-68. Generator, generator drive-belts, adjusting linkage, and mount.

linkage and idler pulley to pulley arm, and remove linkage.

b. Disassembly.

- (1) Loosen locknut on rod end.
- (2) Remove sleeve gage and spring from gage nut.

- (3) Unscrew rod end from gage nut.

c. Inspection and Repair.

(1) Inspect rod end and gage nut for damaged threads. Inspect sleeve gage for dents and cracks. Replace parts that show any of these defects.

(2) Inspect spring for loss of tension. Spring should maintain a free length of $6\frac{3}{8}$ to $6\frac{5}{8}$ inches. Replace spring if free length is not as specified.

d. Assembly.

- (1) Install rod end with locknut on gage nut.
- (2) Install spring and sleeve gage on gage nut.

e. Installation.

(1) Position rod end of linkage and idler pulley to pulley arm, and secure with screw, washer, and nut.

(2) Align hole in linkage sleeve gage and gage nut with generator mount bracket, position two spacers, and secure with screw, washer, and nut.

(3) Install and adjust generator drive-belts (para 2-106).

2-106. Generator Drive-Belts

(fig. 2-68)

a. Adjustment.

(1) Observe gage nut to determine if it is above or below operating range of sleeve gage marker.

(2) If inspection indicates gage nut is above operating range, back off locknut on rod end until gage nut is within operating range. Screw locknut down snug against gage nut.

(3) If inspection indicates gage nut is below operating range, screw locknut clockwise to bring gage nut into operating range.

NOTE

When gage nut is within operating range of sleeve gage marker, belt tension is properly maintained.

b. Removal.

(1) Loosen drive-belts by backing off locknut on rod end of adjusting linkage.

(2) Remove drive-belts from pulley.

c. Inspection and Repair. Inspect drive-belts for

broken, cracked, or frayed condition. Replace both drive-belts with a matched set if either drive-belt shows any of these defects.

d. Installation.

NOTE

When installing replacement drive-belts, always replace both drive belts with a matched set.

(1) Position a matched set of drive-belts on all pulleys.

(2) Adjust drive-belt tension (*a* above)

2-107. Rectifier — Early Models

(fig. 2-69)

NOTE

Rectifier is used on carriers C-1 through C-143 with generator 7954720 (19207). Rectifier is not used on carriers after C-143 when generator-alternator 10947517 (19207) is installed. If generator is to replace the early model generator, perform steps (1) through (3) in *d* below.

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect generator-to-rectifier cable at rectifier.

(2) Disconnect generator regulator-to-rectifier cable at rectifier.

(3) Remove two nuts and washers, and remove rectifier from mount bracket.

b. Inspection and Repair. Check rectifier as described in electrical troubleshooting (para 2-21). Replace rectifier if defective.

c. Installation.

(1) Position rectifier on bracket, and secure with two washers and nuts.

(2) Connect generator regulator-to-rectifier cable at rectifier.

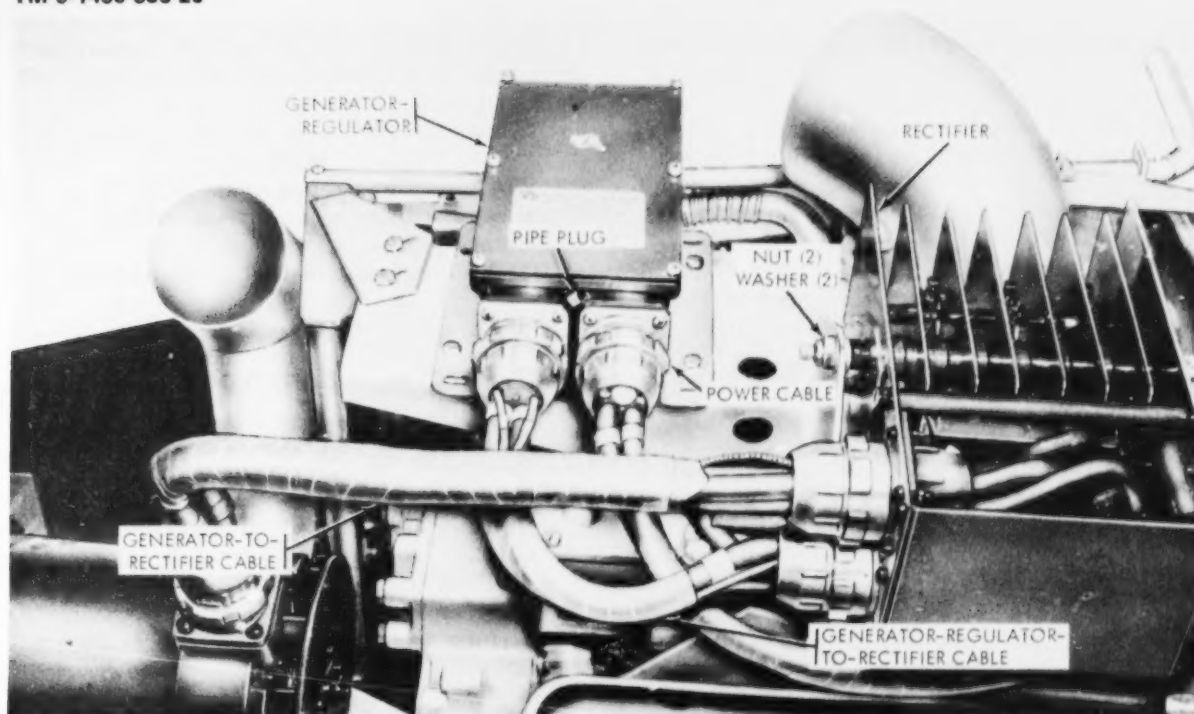
(3) Connect generator-to-rectifier cable at rectifier.

d. Discontinued Use of Rectifier.

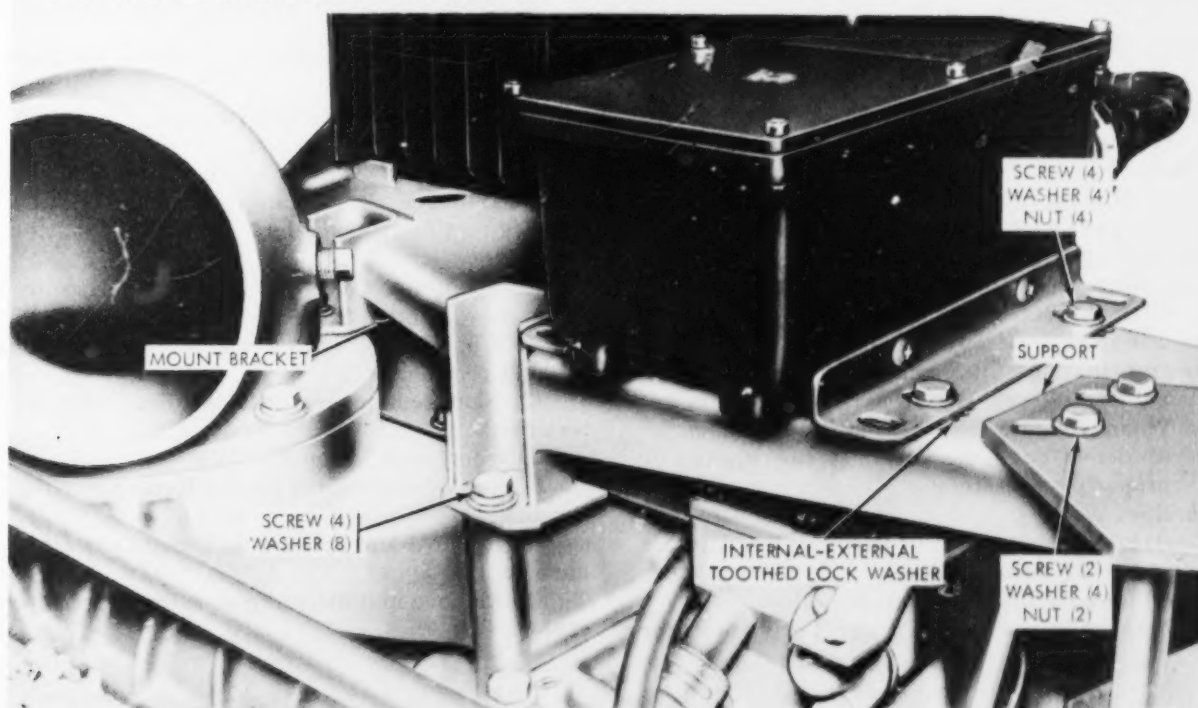
(1) Remove rectifier (*a* above). Return rectifier to stock.

(2) Remove and discard bulkhead-to-rectifier harness.

(3) Remove and discard generator-to-rectifier cable.



A-RECTIFIER AND GENERATOR-REGULATOR INSTALLED ON MOUNT



B-RECTIFIER AND GENERATOR-REGULATOR MOUNT INSTALLED

AT 3808

Figure 2-69. Rectifier, generator-regulator, and mount (early models).

2-108. Generator-Regulator

(fig. 2-69)

a. Adjustment.

(1) Start and run carrier engine (TM 9-1450-585-10) for 15 to 20 minutes with service headlights turned on to provide operating temperature for generator-regulator.

(2) Connect a voltmeter across battery terminals from ground to output.

(3) Remove plug or cover from generator-regulator to expose adjusting screw. See figure 2-70.

(4) Turn off headlights, operate engine at 1,000 to 1,200 rpm, and turn adjusting screw in direction required to obtain a reading between 27.5 to 28.5 volts as indicated on voltmeter.

(5) After adjustment, install cover or plug.

b. Removal.**NOTE**

Make certain master switch is OFF.

(1) On carriers C-1 through C-143:

(a) Disconnect power cable and generator-regulator-to-rectifier cable from generator-regulator.

(b) Remove four screws, nuts, and eight washers securing generator-regulator mounting plate to generator-regulator mount, and remove generator-regulator with plate attached.

(2) On carriers after C-143:

(a) Disconnect power cable and generator-to-generator-regulator cable from generator-regulator.

(b) Remove four screws and eight washers securing generator-regulator mounting plate to generator-regulator mount, and remove generator-regulator with plate attached.

(3) Remove four screws and eight washers securing generator-regulator mounting plate to bottom of generator-regulator, and separate plate from regulator.

c. Inspection and Repair. Check generator-regulator as described in electrical troubleshooting (para 2-21). Replace generator-regulator if defective.

d. Installation.

(1) Position generator-regulator mounting plate on bottom of generator-regulator, and secure with four screws and eight washers. Mount four internal-external toothed lock washers between plate and generator-regulator and four flat washers under screw heads.

(2) On carriers C-1 through C-143:

(a) Position generator-regulator with mounting plate on generator-regulator mount, and secure with four screws and eight washers. Mount four internal-external toothed lock washers between plate and generator-regulator mount and four flat washers under screw heads.

(b) Connect generator-regulator-to-rectifier cable to generator-regulator.

(3) On carriers after C-143:

(a) Position generator-regulator with mounting plate on generator-regulator mount, and secure with four screws and eight washers.

(b) Connect generator-to-generator-regulator cable and power cable to generator-regulator.

e. Test.

(1) Test specific gravity of both carrier batteries (para 2-98). Batteries must be fully charged when testing or adjusting generator-regulator.

(2) Connect a voltmeter across battery terminals from ground to output.

(3) Start and run carrier engine at 2,000 rpm (TM 9-1450-585-10), and turn on service headlights for 25-ampere load. Voltmeter should indicate a reading of 28.0 volts. Adjust generator-regulator (a above) if voltage is incorrect.

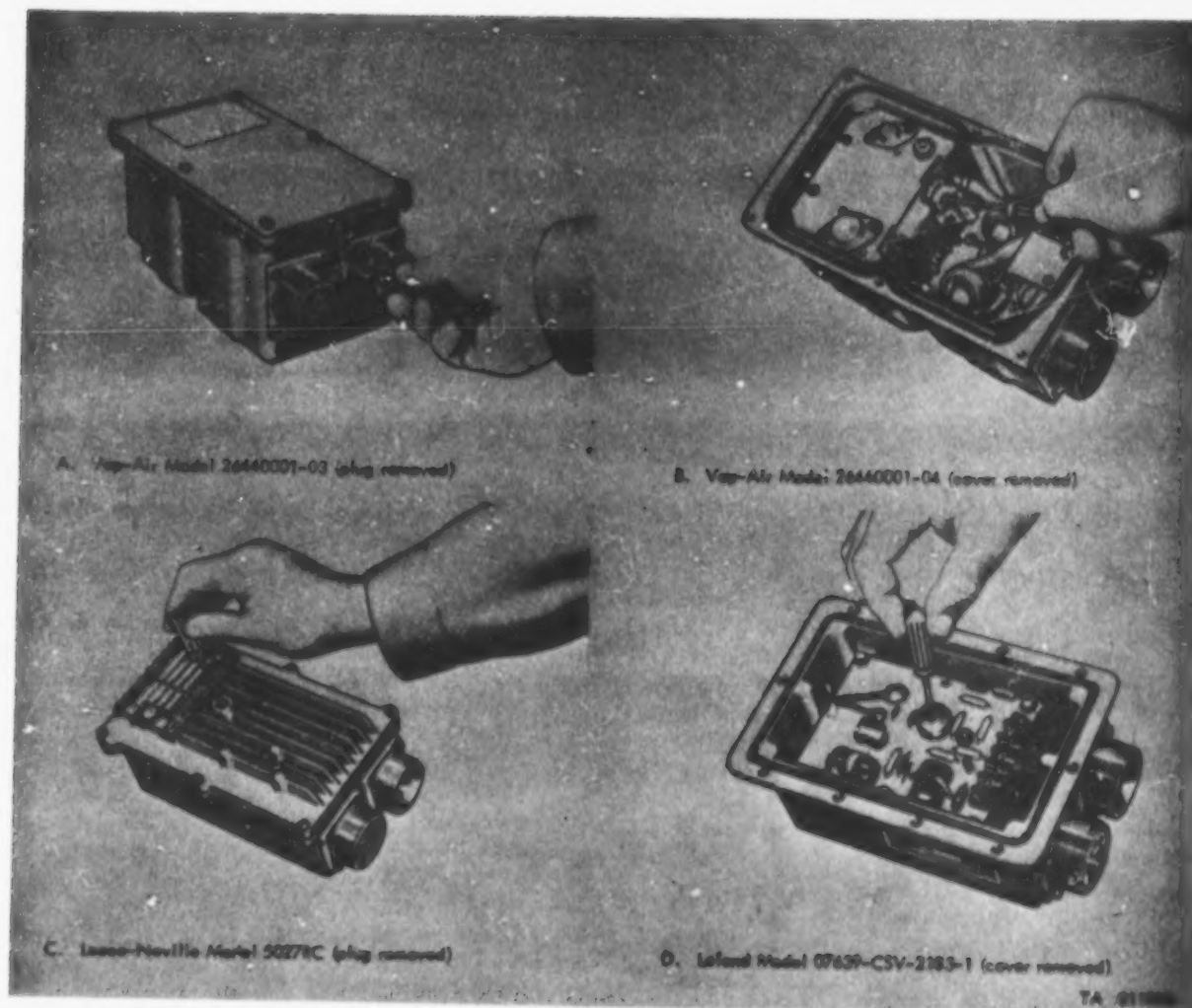


Figure 2-70. Generator-regulator (solid state) adjustment.

2-109. Rectifier and Generator-Regulator Mount (fig. 2-69)

NOTE

Mounting bracket can be removed or installed with rectifier and generator-regulator (carriers C-1 through C-143) or generator-regulator (carriers after C-143) on bracket. Refer to paragraphs 2-107 and 2-108 for removal and installation of rectifier and generator-regulator.

a. Removal.

(1) Disconnect battery negative lead (para 2-98), rectifier cables (para 2-107), and generator-regulator cables (para 2-108).

(2) Remove two screws, four washers, and two

nuts securing engine quick disconnect rear support to mounting bracket, and remove support.

(3) Disconnect fuel cutoff control from governor and regulator mount (para 2-212).

(4) On carriers C-1 through C-143:

(a) Remove one screw, washer, and clamp securing power cable to mounting bracket, and remove cable.

(b) Remove one screw and two clamps securing two radiator vent hoses to mounting bracket, and remove hoses from bracket.

(5) Remove four screws and eight washers securing mounting bracket to engine block, and remove bracket.

NOTE

On carriers without external rectifier, the

generator-regulator mounting bracket is secured to engine block with three screws and three washers.

b. Inspection and Repair. Inspect mounting bracket for breaks and cracks in welds. Repair as required.

c. Installation.

(1) Position mounting bracket on engine block, and secure with four screws and eight washers.

NOTE

On carriers without external rectifier, the generator-regulator mounting bracket is secured to engine block with three screws and three washers.

(2) On carriers C-1 through C-143:

(a) Position two radiator vent hoses on mounting bracket, and secure with two clamps and one screw.

(b) Position power cable on mounting bracket, and secure with one clamp, washer, and screw.

(3) Connect fuel cutoff control to governor and regulator mount (para 2-212).

(4) Position engine quick disconnect control rear support on mounting bracket, and secure with two screws, four washers, and two nuts. Adjust

(5) Connect rectifier cables (para 2-107), generator-regulator cables (para 2-108), and battery negative lead (para 2-98).

2-110. Generator-Regulator Circuit Breaker (fig. 2-71)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove nut and washer, and disconnect auxiliary power receptacle circuit 3 lead from upper terminal of circuit breaker.

(2) Remove nut and washer, and disconnect master switch circuit 3 lead from lower terminal of circuit breaker.

(3) Remove two screws and nuts, and remove circuit breaker from bulkhead.

b. Inspection and Repair. Check circuit breaker as described in electrical troubleshooting (para 2-21). Replace circuit breaker if defective.

c. Installation.

(1) Position circuit breaker in bulkhead, and secure with two screws and nuts.

(2) Position master switch circuit 3 lead to lower terminal of circuit breaker, and secure with washer and nut.

(3) Position auxiliary power receptacle circuit 3 lead to upper terminal of circuit breaker, and secure with washer and nut.

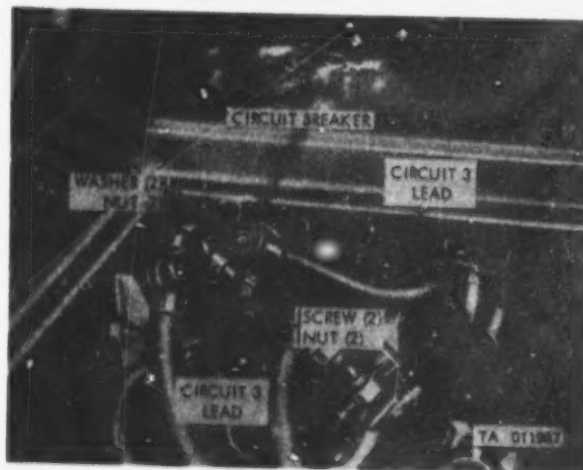


Figure 2-71. Generator-regulator circuit breaker.

2-111. Battery-Generator Indicator (fig. 2-46)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 27E lead (9) from indicator (5).

(3) Remove two nuts (8) and washers (7), and remove indicator (5) and mounting clamp (6) from instrument panel (15).

b. Inspection and Repair. Check battery-generator indicator as described in electrical troubleshooting (para 2-21). Replace indicator if defective.

c. Installation.

(1) Position indicator (5) and clamp (6) on instrument panel (15), and secure with two washers (7) and nuts (8).

(2) Connect circuit 27E lead (9) to indicator.

(3) Install instrument panel (para 2-92).

Section XIII. STARTING SYSTEM

2-112. General

a. *Scope.* This section contains instructions for removal, inspection and repair, and installation of the starter, relay switch, neutral start switch, and starter switch.

b. *Description.* The starting system consists of a starter with solenoid and electrical switches and interconnecting electrical leads and cables. Refer to paragraph 2-22 for an operational and functional description of the starting system.

2-113. Starter

(fig. 2-72)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Remove nut and lock washer, and disconnect circuit 6 and 74C leads at starter solenoid.

(3) Remove machine screw and washer, and disconnect circuit 74D lead at starter adjacent to solenoid.

(4) Remove nut and lock washer, and disconnect circuit 74B lead and ground lead at starter.

(5) Remove machine screw, two bolts, and three lock washers securing starter to engine, and remove starter.

b. Inspection and Repair.

(1) Inspect starter gear teeth for burs and areas worn beyond original shape. Remove burs. Replace starter if worn areas are evident.

(2) Check starter as described in electrical trouble-shooting (para 2-22). Replace starter if defective.

c. Installation.

(1) Position starter on engine, and secure with machine screw, two bolts, and three lock washers.

(2) Connect circuit 74D lead at starter adjacent to solenoid, and secure with machine screw and washer.

(3) Connect circuit 6 and 74C leads at starter solenoid, and secure with nut and lock washer.

(4) Connect circuit 74B and ground leads at starter, and secure with nut and lock washers.

(5) Connect battery negative lead (para 2-98).

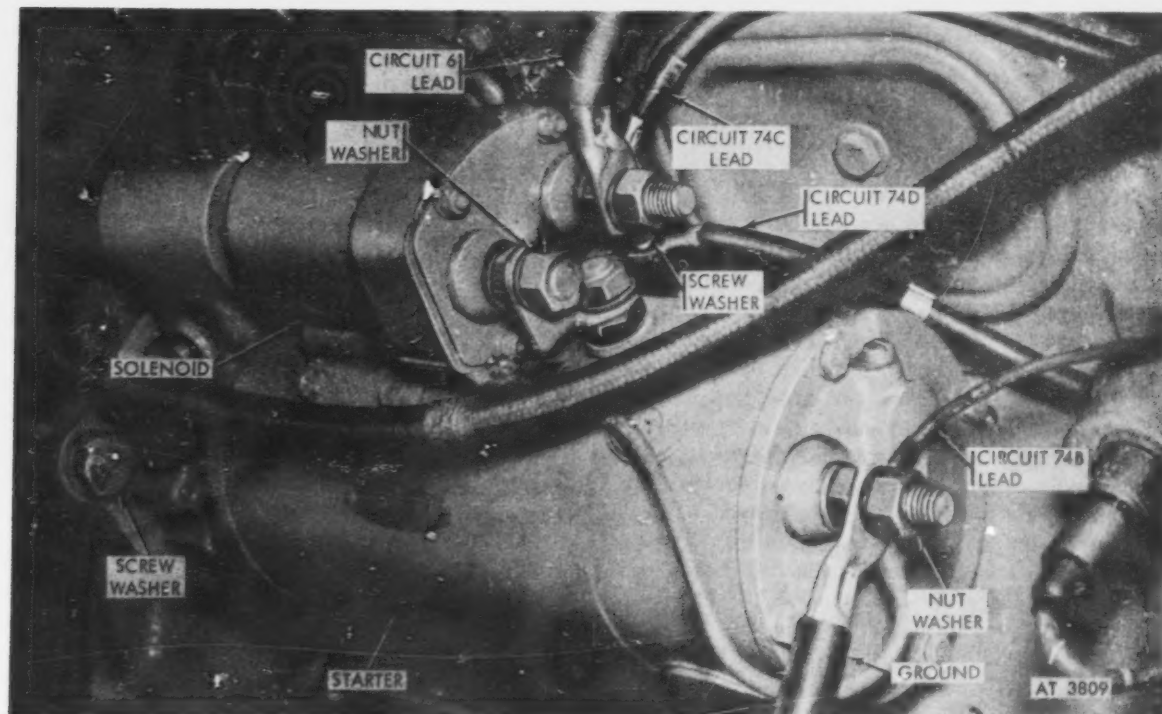


Figure 2-72. Starter.

2-114. Starter Relay Switch

(fig. 2-73)

a. Removal.**NOTE**

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Remove two lock washers, flat washers, and nuts, and disconnect circuit 74C and 74D leads from starter relay switch.

(3) Remove two lock washers and nuts, and disconnect circuit 74A and 74B leads from switch.

(4) Remove two cap screws, flat washers, and selflocking nuts securing switch to secondary fuel filter mounting bracket, and remove switch.

b. Inspection and Repair. Check starter relay switch as described in electrical troubleshooting (para 2-22). Replace switch if defective.

c. Installation.

(1) Position switch to secondary fuel filter mounting bracket, and secure with two cap screws, flat washers, and self-locking nuts.

(2) Connect circuit 74A and 74B leads to switch, and secure with two lock washers and nuts.

(3) Connect circuit 74C and 74D leads to switch, and secure with two lock washers, and nuts.

(4) Connect battery negative lead (para 2-98).

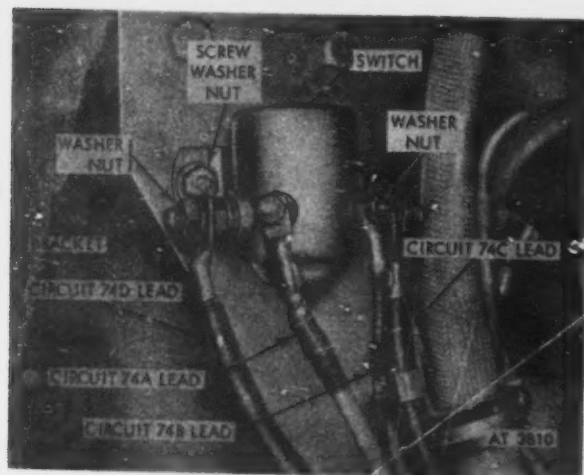


Figure 2-73. Starter relay switch.

2-115. Neutral Start Switch

(fig. 2-74)

a. Adjustment.**NOTE**

Make certain master switch is OFF.

(1) Loosen two machine screws securing neutral start switch mounting plate to range selector housing.

(2) Place range selector lever in N position.

(3) Remove two machine screws, lock washers, and nuts securing guard, switch, and shim to mounting plate, and remove guard, switch, and shim. Discard lock washers.

(4) Move switch up or down to obtain proper adjustment.

(5) Tighten two machine screws when adjustment is satisfactory.

b. Removal.**NOTE**

Make certain master switch is OFF.

(1) Disconnect circuit 74 and 74A leads from electrical harness connectors in cab.

(2) Remove two machine screws, flat washers, and selflocking nuts securing neutral start switch mounting plate to range selector housing, and remove plate.

(3) Remove two machine screws, lock washers, and nuts securing switch and guard to mounting plate, and remove guard and switch.

c. Inspection and Repair. Check neutral start switch as described in electrical troubleshooting (para 2-22). Replace switch if defective.

d. Installation.

(1) Position shim, neutral start switch, and guard on mounting plate, and secure with two machine screws, new lock washers, and nuts.

(2) Position mounting plate to range selector housing, and secure with two machine screws, flat washers, and selflocking nuts.

(3) Connect circuit 74 and 74A leads to electrical harness connectors.

(4) Adjust switch (a above).

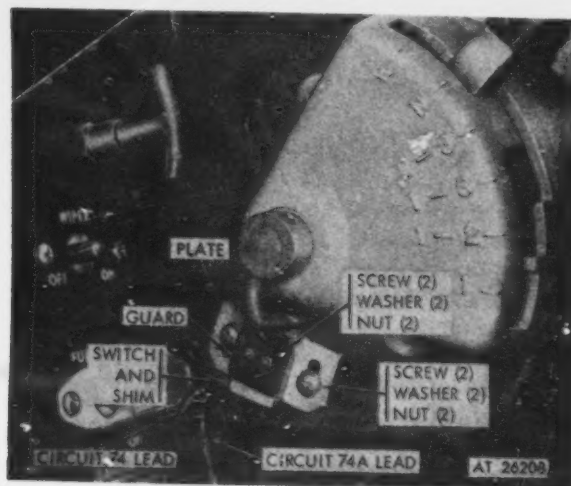


Figure 2-74. Neutral start switch.

2-116. Starter Switch

(fig. 2-35)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 14 lead (24) and circuit 14A lead (25) at starter switch (23).

(3) Remove hex nut (22) and lock washer (21), and remove starter switch from instrument panel (26).

b. Inspection and Repair. Check starter switch

as described in electrical troubleshooting (para 2-22). Replace switch if defective.

c. Installation.

(1) Position starter switch (23) to instrument panel (26), and secure with lock washer (21) and hex nut (22).

(2) Connect circuit 14 lead (24) and circuit 14A lead (25) to switch.

(3) Install instrument panel (para 2-92).

Section XIV. HORN AND LIGHTING SYSTEM

2-117. General

a. Scope. This section contains instructions for removal, adjustment, disassembly, inspection and repair, assembly, and installation of horn and lighting system components described in *b* below.

b. Description. The horn and lighting system consists of a service headlight, infrared headlight, blackout headlight, and blackout marker light mounted in a cluster on the left front of the carrier. A service headlight, infrared headlight, blackout marker light, and horn are mounted in a cluster on the right front of the carrier. The left and right service stop light-taillights are mounted on the rear of the carrier. The left stop light-taillight also contains a blackout stop light and taillight. The horn switch and light selector switch are mounted on the instrument panel. A foot-operated headlight beam selecting switch is mounted on the upper left floor plate. A dome light is mounted under the center of the dash panel.

2-118. Horn

(fig. 2-75)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect circuit 25 lead and ground lead from horn.

(2) Remove two screws, nuts, and washers, and remove horn from bracket.

b. Inspection and Repair. Check horn as described in electrical troubleshooting (para 2-23). Replace horn if defective.

c. Installation.

(1) Position horn on bracket, and secure with two screws, washers, and nuts.

(2) Connect circuit 25 lead and ground lead to horn.

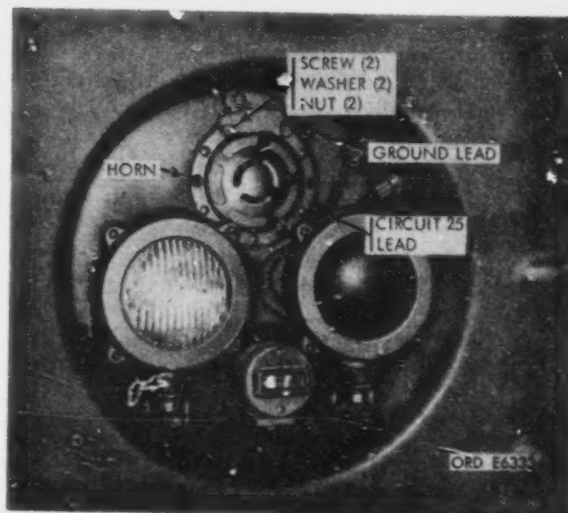


Figure 2-75. Horn.

2-119. Horn Switch

(fig. 2-35)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 25 lead (24) and circuit 25A lead (25) at horn switch (23).

(3) Remove hex nut (22) and lock washer (21), and remove horn switch from instrument panel (26).

b. Inspection and Repair. Check horn switch as described in electrical troubleshooting (para 2-23). Replace switch if defective.

c. Installation.

(1) Position horn switch (23) to instrument

panel (26), and secure with lock washer (21) and hex nut (22).

(2) Connect circuit 25 lead (24) and circuit 25A lead (25) to switch.

(3) Install instrument panel (para 2-92).

2-120. Left Stop Light-Taillight

a. Removal (fig. 2-76).

NOTE

Make certain master switch is OFF.

(1) Remove four screws and washers securing bracket to hull, and pull bracket and light from hull.

(2) Disconnect circuit 21, 22, and 24 leads from light.

(3) Remove two screws and washers securing light to bracket, and separate light, gasket, and bracket. Discard gasket.

b. Disassembly (fig. 2-77).

(1) Remove six screws (9), and remove door (10) from body (7).

(2) Remove gasket (8) from door (10). Discard gasket.

(3) Depress and turn three lamps (1) counterclockwise, and remove from socket (2).

(4) Remove two screws (11) and washers (12), and remove socket (2) from bracket (13).

(5) Remove three screws (14) and washers (15), and remove bracket (13) from body (7).

c. Inspection and Repair.

(1) Inspect all threaded parts for burred or damaged threads. Replace defective threaded parts.

(2) Check lamp and socket as described in electrical troubleshooting (para 2-23). Replace defective parts.

d. Assembly (fig. 2-83).

(1) Position bracket (13) on body (7), and secure with three washers (15) and screws (14).

(2) Position socket (2) in bracket (13), and secure with two washers (12) and screws (11).

(3) Position three lamps (1) in sockets (2), and depress and turn lamps clockwise to secure.

(4) Install new gasket (8) in door (10).

(5) Position door (10) on body (7), and secure with six screws (9).

e. Installation (fig. 2-76).

(1) Position light and new gasket to bracket, and secure with two washers and screws.

(2) Connect circuit 21, 22, and 24 leads to light.

(3) Position light and bracket in hull, and secure with four washers and screws.

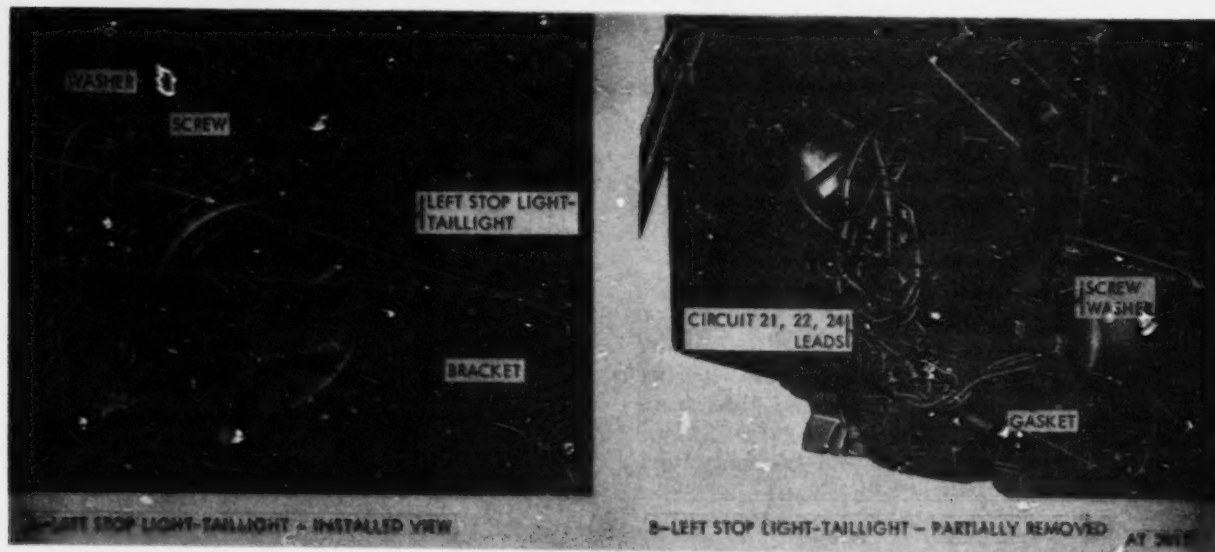
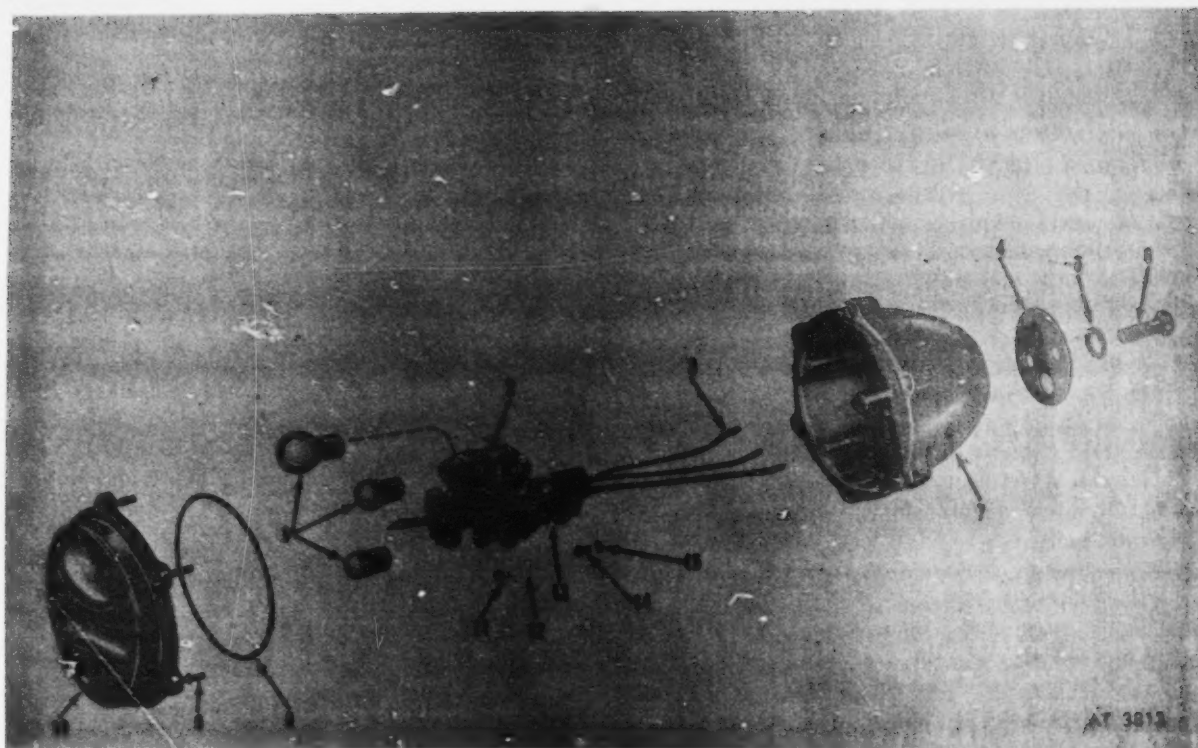


Figure 2-76. Left stoplight-taillight.



- 1 Lamp
- 2 Lamp socket
- 3 Socket lead
- 4 Body gasket
- 5 Body washer

- 6 Body screw
- 7 Light body
- 8 Door gasket
- 9 Door screw
- 10 Light door

- 11 Socket screw
- 12 Socket washer
- 13 Socket bracket
- 14 Bracket screw
- 15 Bracket washer

Figure 2-77. Left stop light-tailight—exploded view.

2-121. Right Stop Light-Tailight

a. Removal (fig. 2-78).

NOTE

Make certain master switch is OFF.

(1) Remove four screws and washers securing bracket to hull, and pull bracket and light from hull.

(2) Disconnect circuit 23 and 24 leads from light.

(3) Remove two screws and washers securing light to bracket, and separate light, gasket, and bracket. Discard gasket.

b. Disassembly (fig. 2-79).

(1) Remove six screws (13), and remove door (1) from body (9).

(2) Remove gasket (2) from door (1). Discard gasket.

(3) Depress and turn two lamps (3) counterclockwise, and remove from socket (7).

(4) Remove two screws (4) and washers (5), and remove socket (7).

(5) Remove three screws (6), and remove bracket (8) from body (9).

c. Inspection and Repair.

(1) Inspect all threaded parts for burred or damaged threads. Replace defective threaded parts.

(2) Check lamp and socket as described in electrical troubleshooting (para 2-23). Replace defective parts.

d. Assembly (fig. 2-79).

(1) Position bracket (8) in body (9), and secure with three screws (6).

(2) Position socket (7) to bracket (8), and secure with two washers (5) and screws (4).

(3) Position two lamps (3) in socket (7), depress and turn lamps clockwise to secure.

(4) Secure door (1) and new gasket (2) to body (9) with six screws (13).

e. Installation (fig. 2-78).

(1) Position light and new gasket to bracket, and secure with two washers and screws.

(2) Connect circuit 23 and 24 leads to light.

(3) Position light and bracket in hull, and secure with four washers and screws.

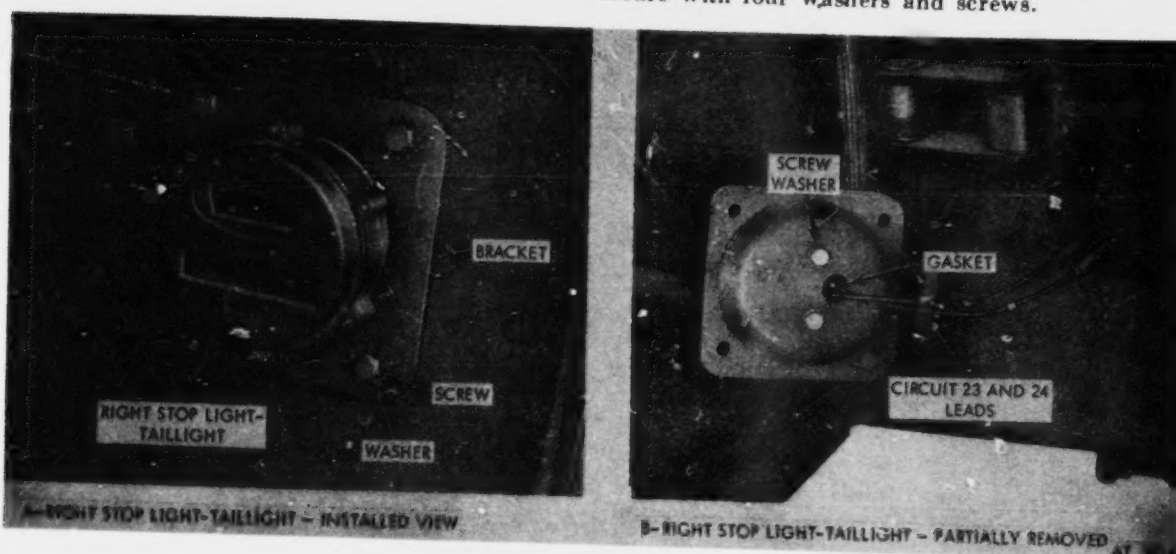
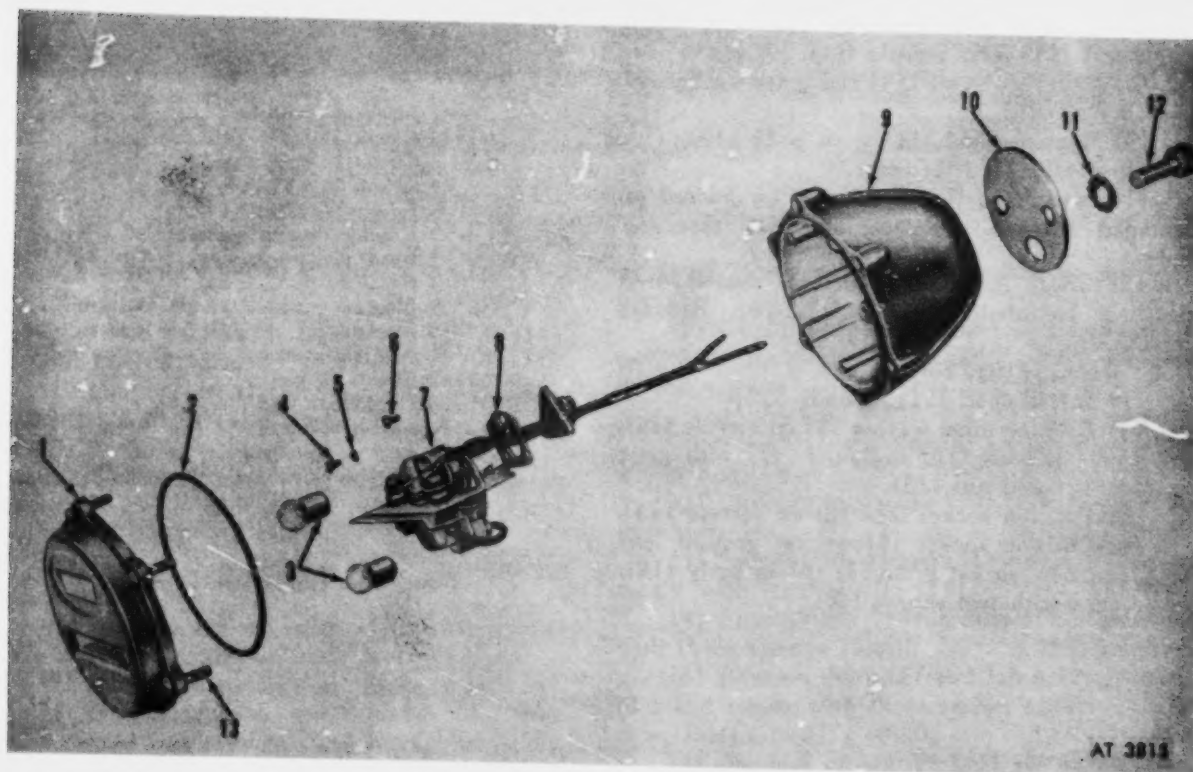


Figure 2-78. Right stop light-taillight.



- 1 Light door
- 2 Door gasket
- 3 Lamp
- 4 Socket screw

- 5 Socket washer
- 6 Bracket screw
- 7 Lamp socket
- 8 Socket bracket
- 9 Light body

- 10 Body gasket
- 11 Body washer
- 12 Body screw
- 13 Door screw

Figure 2-79. Right stop light-taillight—exploded view.

2-122. Blackout Marker Light

NOTE

Maintenance procedures for left and right blackout marker lights are similar.

a. Removal (fig. 2-80).

NOTE

Make certain master switch is off.

(1) Disconnect circuit 20 lead (12) from blackout marker light (9).

(2) Remove self-locking nut (11) and lock washer (10), and remove light from bracket.

b. Disassembly (fig. 2-81).

(1) Remove two machine screws (1), and remove door (2) from body (10).

(2) Remove gasket (3) from door. Discard gasket.

(3) Depress and turn lamp (4) counterclockwise, and remove from lamp socket (7).

(4) Remove two machine screws (5) from lamp socket (7), socket ground lead (15), and socket grommet (6).

(5) Remove socket lead (8) from ferrule (14).

(6) Remove socket (7) from body (10), and remove two grommets (6). Discard grommets.

(7) Remove outer washer (12) and sheet spring nut (13) from ferrule (14).

(8) Remove ferrule (14) and inner washer (9) from body (10).

(9) Remove shell (11) from body (10).

c. Inspection and Repair.

(1) Inspect all threaded parts for burred or damaged threads. Replace defective threaded parts.

(2) Check lamp and socket as described in electrical troubleshooting (para 2-23). Replace defective parts.

d. Assembly (fig. 2-81).

(1) Install shell (11) in body (10).

(2) Position inner washer (9) on ferrule (14), and secure to body (10) and shell (11) with outer washer (12) and nut (13).

(3) Position socket lead (8) on ferrule (14).

(4) Position socket (7), socket ground lead (15), and new socket grommet (6) in body (10), and secure with two screws (5).

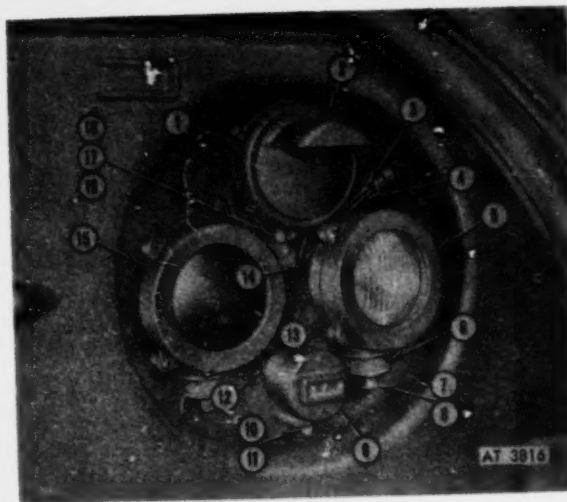
(5) Position lamp (4) in socket (7), depress and turn lamp clockwise to secure.

(6) Position new gasket (3) and door (2) to body (10), and secure with two screws (1).

e. Installation (fig. 2-80).

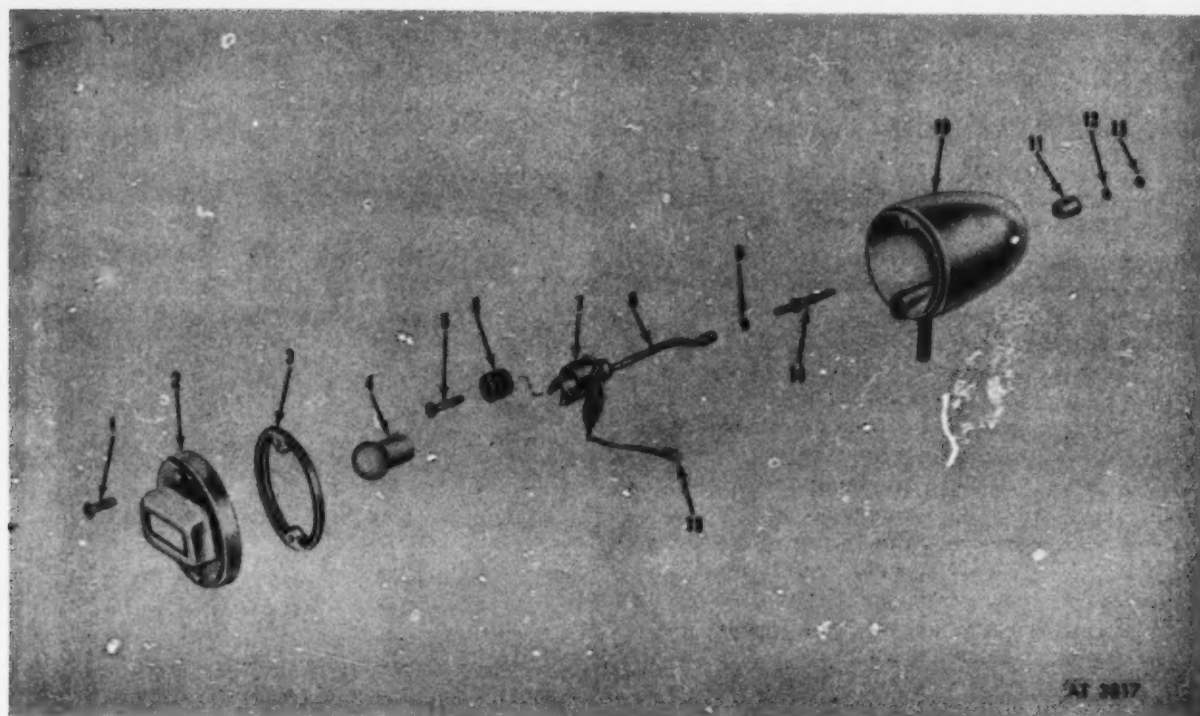
(1) Position blackout marker light (9) on hull bracket, and secure with self-locking nut (11) and lock washer (10).

(2) Connect circuit 20 lead (12) to light (9).



- 1 Blackout headlight
- 2 Circuit 19 lead
- 3 Circuit 17 lead
- 4 Circuit 18 lead
- 5 Service headlight
- 6 Headlight convex washer
- 7 Headlight lock washer
- 8 Headlight hexagon nut
- 9 Blackout marker light
- 10 Blackout marker light lock washer
- 11 Blackout marker light self-locking nut
- 12 Circuit 20 lead
- 13 Circuit 515 lead
- 14 Circuit 514 lead
- 15 Infrared headlight
- 16 Blackout headlight lock washer
- 17 Blackout headlight self-locking nut
- 18 Blackout headlight convex washer

Figure 2-80. Driving lights—left side.



- 1 Door machine screw
- 2 Door assembly
- 3 Door gasket
- 4 Lamp
- 5 Socket machine screw

- 6 Socket grommet
- 7 Socket
- 8 Socket electrical lead
- 9 Inner nonmetallic washer
- 10 Body

- 11 Electrical connector shell
- 12 Outer nonmetallic washer
- 13 Sheet spring nut
- 14 Electrical conductor ferrule
- 15 Socket ground lead

Figure 2-81. Blackout marker light—exploded view.

2-123. Blackout Headlight

a. Removal (fig. 2-80).

NOTE

Make certain master switch is OFF.

(1) Disconnect circuit 19 lead (2) from blackout headlight (1).

(2) Remove self-locking nut (17) and lock washer (16), and remove headlight and convex washer (18) from hull bracket.

b. Disassembly (fig. 2-82).

(1) Loosen three screws (11), and remove door (1) from body (4).

(2) Remove locking wire (12) from screws (11), and remove screws from door (1).

(3) Remove three springs (2) from door (1).

(4) Disconnect two lamp leads (10) from connector (6) and body (4), and remove lamp (3).

(5) Remove connector (6) from body (4).

(6) Remove grommet (5) from body (4). Discard grommet.

c. Inspection and Repair.

(1) Inspect all threaded parts for burred or

damaged threads. Replace defective threaded parts.

(2) Check lamp and socket as described in electrical troubleshooting (para 2-23). Replace defective parts.

d. Assembly (fig. 2-82).

(1) Position connector (6) and new grommet (5) in body (4).

(2) Connect two leads (10) to connector (6) and body (4).

(3) Position three screws (11) in door (1), and secure with locking wire (12).

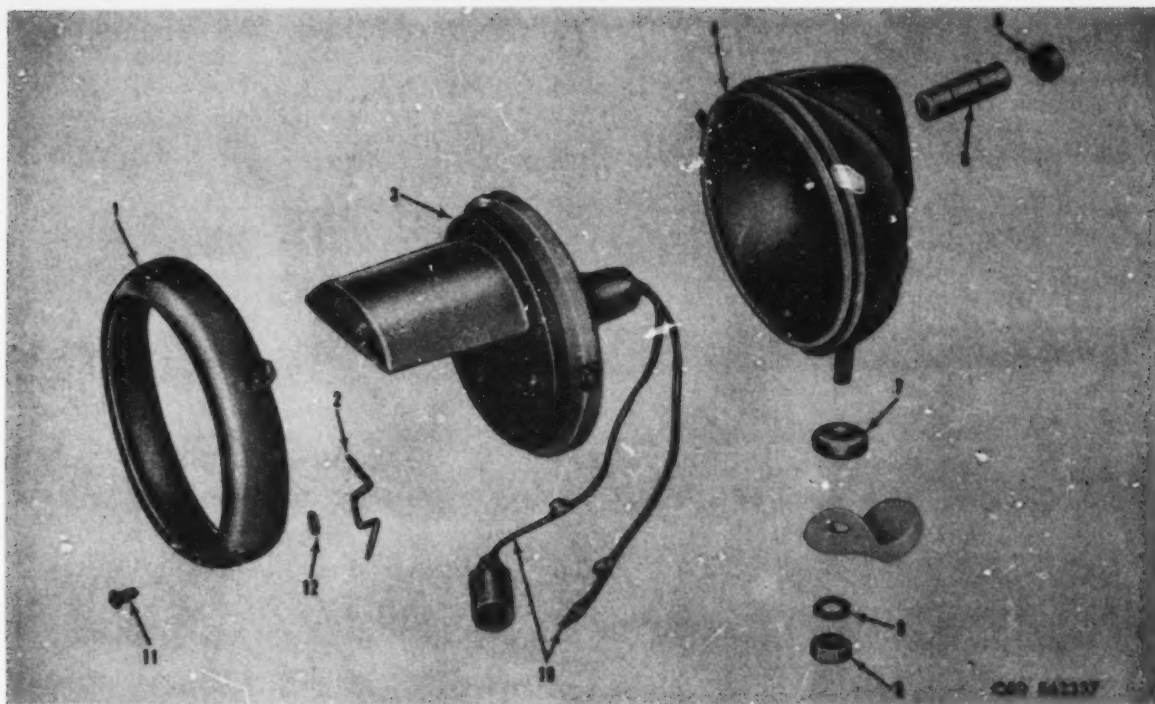
(4) Position lamp (3) in door (1), and secure with three springs (2).

(5) Position door (1) and lamp (3) in body (4), and secure with three screws (11).

e. Installation (fig. 2-80).

(1) Connect circuit 19 lead (2) to blackout headlight (1).

(2) Position convex washer (18) and headlight to hull bracket, and secure with washer (16) and nut (17).



- | | | |
|------------------------|-------------------------|-----------------|
| 1 Light door | 5 Grommet | 9 Light nut |
| 2 Lamp retainer spring | 6 Connector | 10 Lead |
| 3 Lamp unit | 7 Convex washer | 11 Door screw |
| 4 Light body | 8 Light nut lock washer | 12 Locking wire |

Figure 2-82. Blackous headlight—exploded view.

2-124. Service and Infrared Headlights

NOTE

The service and infrared headlights are removed, disassembled, assembled, and installed in a similar manner.

a. Removal (fig. 2-80).

NOTE

Make certain master switch is OFF.

(1) Disconnect circuit 17 lead (3) and circuit 18 lead (4) from service headlight (5) or disconnect circuit 514 lead (14) and circuit 515 lead (13) from infrared headlight (15).

(2) Remove nut (8) and washer (7), and remove headlight and convex washer (6) from hull bracket.

b. Disassembly (fig. 2-83).

(1) Loosen four body screws (26), and remove door (25) from body (6).

(2) Loosen four body screws (20), and remove plate (2) from door (25).

(3) Remove service lens (21) or infrared lens (1) from door (25).

(4) Remove gaskets (22 and 23) from door (25). Discard gaskets.

(5) Remove locking wire (24) from body screws (26), and remove screws from door (25).

(6) Loosen three body screws (19), and remove plate (3) and lamp unit (4) from body (6).

(7) Remove machine screw (17) and lock washer (18) securing lamp unit connector (5) lead to mounting stud (11).

(8) Disconnect leads of lamp unit connector (5) from connector plate (7), remove two machine screws (8), and remove connector plate (7).

(9) Remove two preformed packings (9) from connector plate (7). Discard preformed packings.

(10) Remove four machine screws (12) from mounting stud (11), and remove mounting stud (11) from body (6).

(11) Remove preformed packing (10) from mounting stud (11). Discard preformed packing.

c. Inspection and Repair.

(1) Inspect all threaded parts for burred or

damaged threads. Remove burs. Replace parts that have damaged threads.

(2) Check connector, lamp unit, and connector plate as described in electrical troubleshooting (para 2-23). Replace defective parts.

d. Assembly (fig. 2-83).

(1) Position new preformed packing (10) on mounting stud (11).

(2) Connect lead of lamp unit connector (5) to mounting stud (11) with machine screw (17) and lock washer (18).

(3) Position mounting stud (11) to body (6), and secure with four machine screws (12).

(4) Position connector plate (7) and two new preformed packings (9) to body (6), and secure with two machine screws (8).

(5) Connect leads of lamp unit connector (5) to connector plate (7).

(6) Connect lamp unit (4) to lamp unit

connector (5), position retainer plate (3) and lamp unit (4) to body (6), and secure with three body screws (19).

(7) Position two new gaskets (22 and 23) in door (25).

(8) Position four body screws (26) in door (25), and secure with locking wire (24).

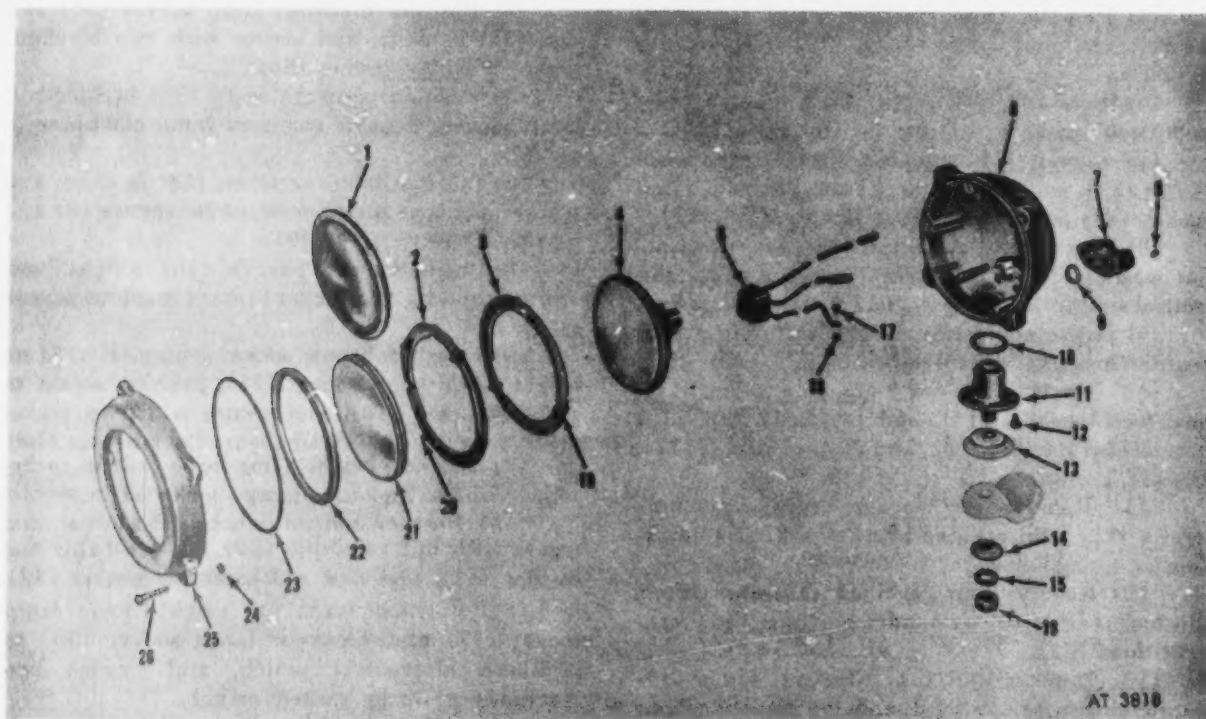
(9) Position infrared lens (1) or service lens (21) and retainer plate (2) in door (25).

(10) Position door (25) to body (6), and secure with four body screws (26).

e. Installation (fig. 2-80).

(1) Connect circuit 17 lead (3) and circuit 18 lead (4) to service headlight (5) or connect circuit 514 lead (14) and circuit 515 lead (13) to infrared headlight (15).

(2) Position headlight and convex washer (6) to hull bracket, and secure with washer (7) and nut (8).



- 1 Infrared lens
- 2 Lens retainer plate
- 3 Lamp retainer plate
- 4 Lamp unit
- 5 Lamp unit connector
- 6 Body
- 7 Connector plate
- 8 Machine screw
- 9 Connector plate preformed packing

- 10 Mounting stud preformed packing
- 11 Mounting stud
- 12 Mounting stud machine screw
- 13 Convex washer
- 14 Mounting stud convex washer
- 15 Lock washer
- 16 Plain hexagon nut
- 17 Connector lead machine screw

- 18 Connector lead lock washer
- 19 Lamp unit retainer plate body screw
- 20 Lens retainer plate body screw
- 21 Service lens
- 22 Lens gasket
- 23 Door gasket
- 24 Locking wire
- 25 Lens door
- 26 Door body screw

Figure 2-83. Service and infrared headlight—exploded view.

2-125. Cab Dome Light

a. Removal (fig. 2-84).

NOTE

Make certain master switch is OFF.

(1) Disconnect circuit 38 lead from dome light.

(2) Remove four cap screws, internal toothed washers, and internal-external toothed washers securing dome light and ground lead to hull weld nuts, and remove dome light.

b. Disassembly (fig. 2-85).

(1) Loosen eight door machine screws (23), and remove door (22) from body (4).

(2) Disconnect light lead (7) from connector switch (37) and circuit 38 lead connector (2), remove lead connector (2), and remove lead.

(3) Remove two machine screws (1) from connector (2) and light body (4).

(4) Remove connector (2) and gasket (3) from body (4). Discard gasket.

(5) Remove knob machine screw (27), lock washer (28), and control knob (29) from control switch (37).

(6) Remove setscrew (26), knob plunger (24), and knob spring (25) from control knob (29).

(7) Loosen two machine screws on control switch (37), and remove leads from blackout lamp socket (38) and bright dome lamp socket (11).

(8) Remove nut assembly (30), nut assembly flat washer (31), nut assembly gasket (32), and control switch (37) from door (22). Discard gasket.

(9) Depress and turn bright dome lamp (12) counterclockwise, and remove from socket (11).

(10) Remove two socket machine screws (14), four lock washers (16), and two grommets (15) from socket bracket (18), and remove socket (11). Discard grommets.

(11) Remove two socket bracket machine screws (17), and remove bracket (18) from light door.

(12) Remove four partition machine screws (8), lock washer (9), and lamp partition (43) from light door (22).

(13) Depress and turn blackout lamp (39) counterclockwise, and remove lamp from blackout lamp socket (38).

(14) Remove two blackout socket machine screws (36), blackout lamp socket (38), and pad (35) from light door.

(15) Remove two plate machine screws (33), plate (34), and switch ground lead (13) from light door.

(16) Remove door gasket (21) from light door. Discard gasket.

(17) Remove seven plate machine screws (10), lens retainer plate (42), blackout lamp lens (41),

blackout lens gasket (40), bright lamp lens (19), and bright lens gasket (20) from light door. Discard gaskets.

c. Inspection and Repair.

(1) Inspect all threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

(2) Check lamps and sockets as described in electrical troubleshooting (para 2-23). Replace defective parts.

d. Assembly (fig. 2-85).

(1) Position bright lamp lens (19) and new bright lens gasket (20), blackout lamp lens (41) and new blackout lens gasket (40), and lens retainer plate (42) in light door (22), and secure with seven plate machine screws (10).

(2) Install new door gasket (21) in door.

(3) Position ground lead (13) and plate (34) in light door, and secure with two plate machine screws (33).

(4) Position blackout lamp socket (38) and pad (35) in door, and secure with two blackout socket machine screws (36).

(5) Position blackout lamp (39) in blackout lamp socket; depress and turn lamp clockwise to secure.

(6) Position lamp partition (43) in door, and secure with four partition machine screws (8) and partition lock washers (9).

(7) Position socket bracket (18) in light door, and secure with two socket bracket machine screws (17).

(8) Install two new socket grommets (15) on bright dome lamp socket (11), position socket to socket bracket (18), and secure with two socket machine screws (14) and socket flat washers (16).

(9) Position bright dome lamp (12) in socket (11); depress and turn lamp clockwise to secure.

(10) Position control switch (37) in door, and secure with nut assembly (30), nut assembly flat washer (31), and new nut assembly gasket (32).

(11) Position leads for bright dome lamp socket (11) and blackout lamp socket (38) to terminals of control switch, and tighten two machine screws on control switch.

(12) Install knob spring (25) and knob plunger (24) in control knob (29), and secure with setscrew (26).

(13) Position control knob (29) on control switch, and secure with knob machine screw (27) and knob lock washer (28).

(14) Position circuit 38 lead connector (2) and new gasket (3) on light body (4), and secure with two machine screws (1).

(15) Connect light lead (7) to circuit 38 lead connector and to control switch (37).

(16) Position light door (22) on light body (4), and secure with eight machine screws (23).
e. Installation (fig. 2-84).

(1) Position dome light and ground lead to hull weld nuts, and secure with four internal-external toothed washers (between light and weld nuts), internal toothed washers, and cap screws.

(2) Connect circuit 38 lead to dome light.

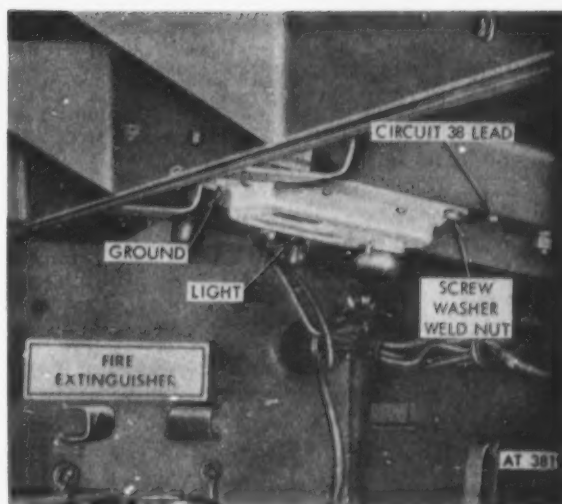


Figure 2-84. Cab dome light.

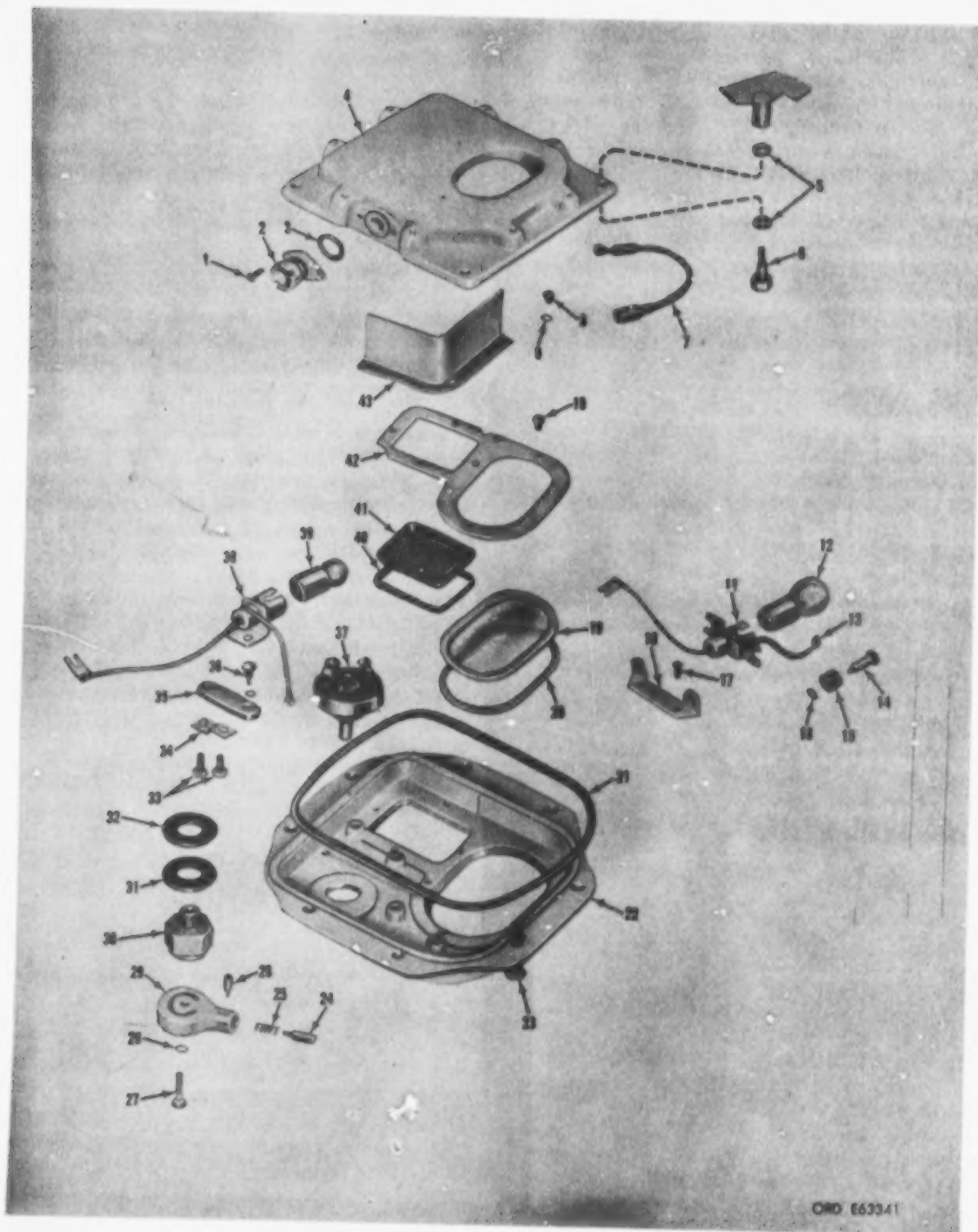


Figure 2-85. Cab dome light—exploded view.

Legend to fig. 2-85.

- 1 Connector screw
- 2 Circuit 38 lead connector
- 3 Connector gasket
- 4 Light body
- 5 Mounting washer
- 6 Mounting screw
- 7 Light lead
- 8 Partition screw
- 9 Partition washer
- 10 Retainer plate screw
- 11 Bright dome lamp socket
- 12 Bright dome lamp
- 13 Ground lead
- 14 Bright dome lamp socket screw
- 15 Socket grommet
- 16 Socket washer
- 17 Socket bracket screw
- 18 Socket bracket
- 19 Bright lamp lens
- 20 Bright lens gasket
- 21 Door gasket
- 22 Light door
- 23 Door screw
- 24 Knob plunger
- 25 Knob spring
- 26 Setscrew
- 27 Knob screw
- 28 Knob washer
- 29 Control knob
- 30 Nut assembly
- 31 Nut assembly washer
- 32 Nut assembly gasket
- 33 Wire plate screw
- 34 Wire plate
- 35 Blackout socket pad
- 36 Blackout socket pad screw
- 37 Control switch
- 38 Blackout lamp socket
- 39 Blackout lamp
- 40 Blackout lens gasket
- 41 Blackout lamp lens
- 42 Lens retainer plate
- 43 Lamp partition

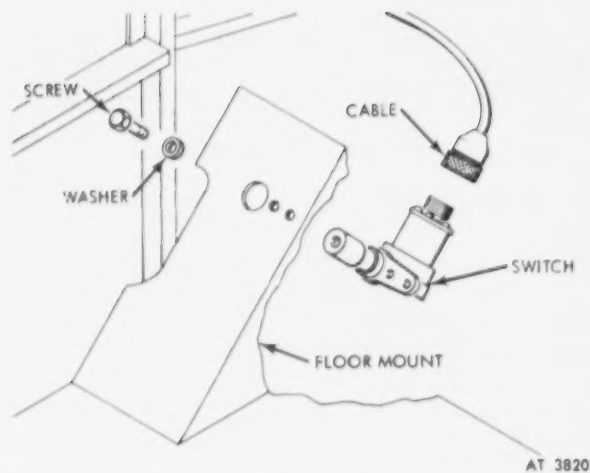


Figure 2-86. Beam selecting switch.

2-126. Beam Selecting Switch

(fig. 2-86)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect electrical harness cable from beam selecting switch.

(2) Remove two cap screws and lock washers securing switch to floor mount, and remove switch.

b. *Inspection and Repair.* Check beam selecting switch as described in electrical troubleshooting (para 2-23). Replace switch if defective.

c. Installation.

(1) Position beam selecting switch to floor mount, and secure with two cap screws and lock washers.

(2) Connect electrical harness cable to switch.

2-127. Infrared-Blackout Selector Switch

(fig. 2-35).

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 514-515 (37), circuit 520

(36), and circuit 19 (35) leads at infrared-blackout selector switch (18).

(3) Remove two machine screws (20) and lock washers (19) securing switch to instrument panel (26), and remove switch.

b. *Inspection and Repair.* Check infrared-blackout selector switch as described in electrical troubleshooting (para 2-23). Replace switch if defective.

c. Installation.

(1) Position infrared-blackout selector switch (18) to instrument panel (26), and secure with two machine screws (20) and lock washers (19).

(2) Connect circuit 19 (35), circuit 520 (36), and circuit 514-515 (37) leads to switch.

(3) Install instrument panel (para 2-92).

2-128. Light Selector Switch

(fig. 2-35)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect electrical cable connector (11) from light selector switch (12).

(3) Remove screw (31) securing upper light switch knob (30) to switch, and remove knob.

(4) Remove four machine screws (32), and remove switch from instrument panel (26).

b. *Inspection and Repair.* Check light selector switch as described in electrical troubleshooting (para 2-23). Replace switch if defective.

c. Installation.

(1) Position light selector switch (12) to instrument panel (26), and secure with four machine screws (32).

- (2) Secure upper light switch knob (30) to switch with screw (31).
- (3) Connect electrical cable connector (11) to switch.
- (4) Install instrument panel (para 2-92).

2-129. Stop Light Switch (fig. 2-87)

a. Adjustment.

- (1) Raise center personnel seat and secure in raised position.
- (2) Loosen two cap screws securing stop light switch to mounting bracket.
- (3) Pull steering levers back, and place in first notch of quadrant.
- (4) Position switch so stop light is on.
- (5) Release steering levers; stop light should go off.
- (6) Tighten cap screws securing switch to bracket.
- (7) Lower center personnel seat.

b. Removal.

NOTE

Make certain master switch is OFF.

- (1) Raise center personnel seat and secure in raised position.
- (2) Disconnect circuit 75 and 75A leads from stoplight switch.
- (3) Remove two screws, nuts, and four washers

securing switch to mounting bracket, and remove switch.

c. *Inspection and Repair.* Check stop light switch as described in electrical troubleshooting (para 2-23). Replace switch if defective.

d. Installation.

- (1) Position stop light switch on mounting bracket, and secure with two screws, nuts, and four washers.
- (2) Connect circuit 75 and 75A leads to switch.
- (3) Adjust switch (a above).
- (4) Lower center personnel seat.

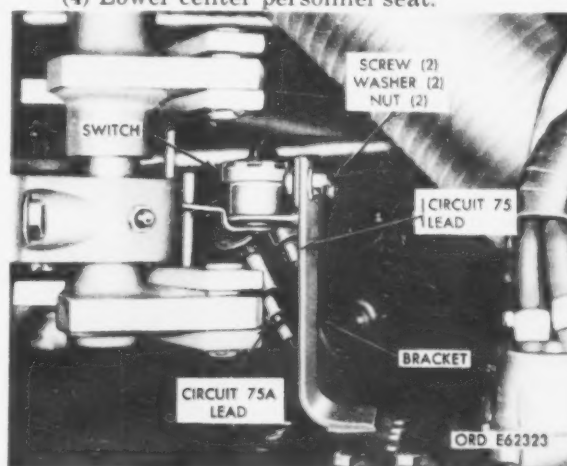


Figure 2-87. Stop light switch.

Section XV. POWER PLANT WIRING HARNESS AND RELATED PARTS

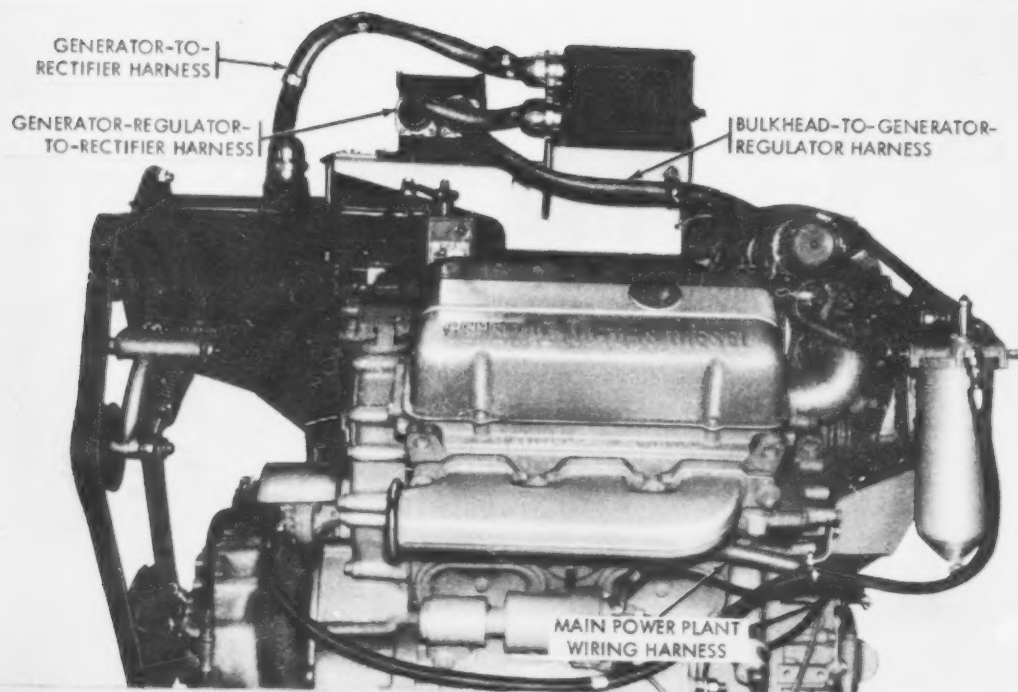
2-130. General

a. *Scope.* This section contains instructions for removal, inspection and repair, and installation of the power plant wiring harness and related parts described in b below.

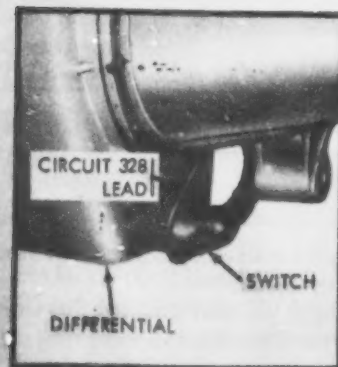
b. *Description.* The power plant wiring harness interconnects the engine oil low pressure switch and warning light; engine coolant temperature transmitter and indicator; differential oil high temperature switch and warning light; transmission oil high temperature switch and warning

light; air box heater and switch; fuel pump switch and fuel pumps; and starter, starter relay, and starter switch. See figure 2-4 for electrical circuit diagram of the power plant wiring harness. See figure 2-88 for power plant switches, transmitters, and wiring harness connections. See figure 2-88.1 for late model power plant wiring harnesses.

c. *Torque Wrench Specifications.* Refer to table 2-17 for torque tightness readings of power plant switches and transmitters.



A-POWER PLANT WIRING HARNESS



B-POWER PLANT SWITCHES AND TRANSMITTERS

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Figure 2-88. Power plant wiring harness, switches, and transmitters (early models).

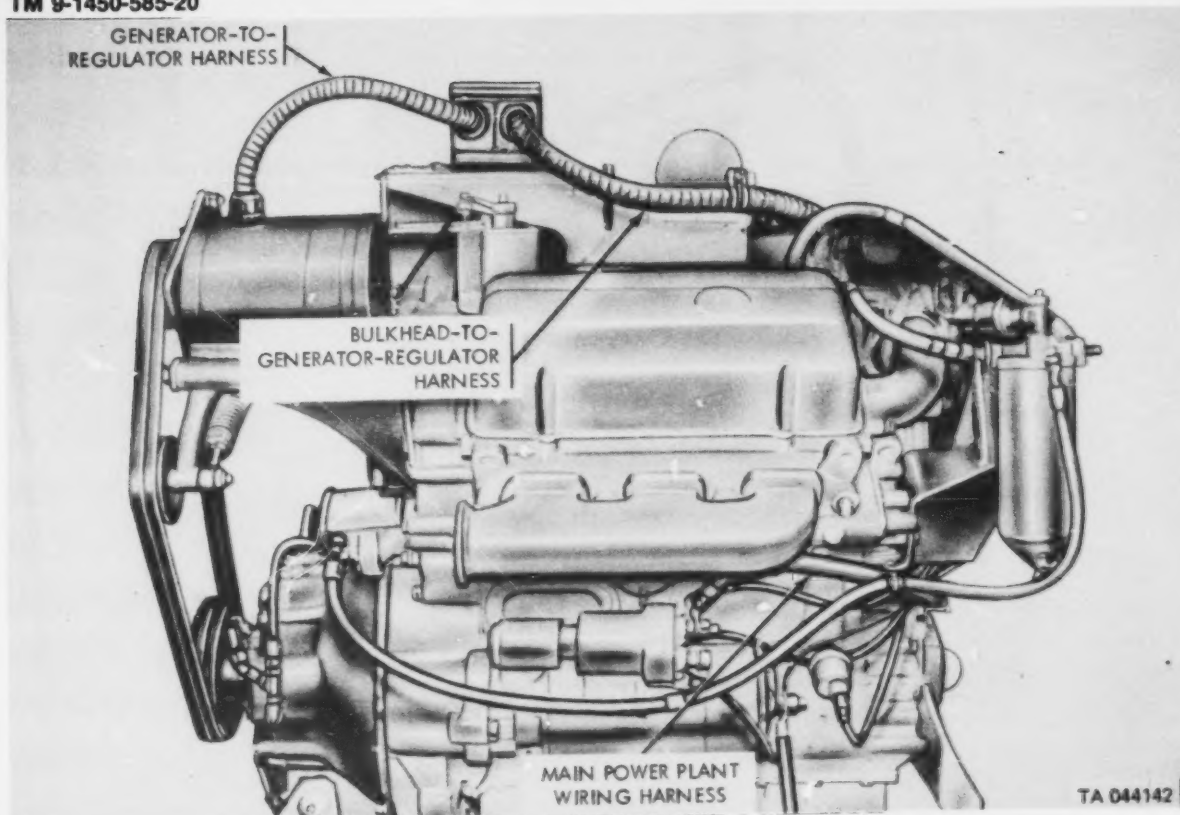


Figure 2-88.1. Power plant wiring harnesses (late models).

Table 2-17. Power Plant Switches Torque Wrench Specifications

Fig. no.	View	Component	Pound-feet torque
2-88	B	Differential oil high temperature switch	20-25
2-88	B	Transmission oil high temperature switch	20-25

2-131. Wiring Harness

NOTE

Make certain master switch is OFF.

a. Inspection. Examine harness for frayed, broken, or cracked insulation. Check for damaged or missing connectors and terminals. Replace missing or damaged connectors and terminals. If wiring harness needs replacement, notify direct-support maintenance personnel.

b. Repair. Repair of the power plant wiring harness is limited to replacing connectors and terminals. See figures 2-63 and 2-93 for repairing the power plant wiring harness.

2-132. Engine Oil Low Pressure Switch (fig. 2-88)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect circuit 34 lead from switch.

- (2) Turn switch counterclockwise, and remove switch from engine block.

b. Inspection and Repair. Check switch as described in electrical troubleshooting (para 2-24). Replace switch if defective.

NOTE

Late models are equipped with a more sensitive pressure switch (4 to 8 psi). Install switch (4 to 8 psi) in place of switch (9 to 13 psi).

c. Installation.

- (1) Position engine oil low pressure switch on engine block, and turn switch clockwise to secure.
- (2) Connect circuit 34 lead to switch.

2-133. Engine Coolant Temperature Transmitter (fig. 2-88)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect circuit 33 lead from transmitter.
- (2) Turn transmitter counterclockwise, and remove transmitter from thermostat housing.

b. Inspection and Repair. Check transmitter as described in electrical troubleshooting (para 2-24). Replace transmitter if defective.

c. Installation.

- (1) Position transmitter on thermostat housing, and turn transmitter clockwise to secure.
- (2) Connect circuit 33 lead to transmitter.

2-134. Differential Oil High Temperature Switch

(fig. 2-88)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect circuit 328 lead from switch.
- (2) Turn switch counterclockwise, and remove from differential fitting.

b. Inspection and Repair. Check differential oil high temperature switch as described in electrical troubleshooting (para 2-24). Replace switch if defective.

c. Installation.

- (1) Position differential oil high temperature switch on differential fitting, and turn switch clockwise to secure. Tighten switch to 20 to 25 pound-feet torque.
- (2) Connect circuit 328 lead to switch.

2-135. Transmission Oil High Temperature Switch

(fig. 2-88)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect circuit 327 lead from switch.
- (2) Turn switch counterclockwise, and remove switch from transmission oil cooler fitting.

b. Inspection and Repair. Check transmission oil high temperature switch as described in electrical troubleshooting (para 2-24). Replace switch if defective.

c. Installation.

- (1) Position transmission oil high temperature switch on transmission oil cooler fitting, and turn switch clockwise to secure. Tighten switch to 20 to 25 pound-feet torque.
- (2) Connect circuit 328 lead to switch.

2-136. Engine Coolant Temperature Indicator

(fig. 2-46)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Partially remove instrument panel (para 2-92).

- (2) Disconnect circuit 27B lead (28) and circuit 33 lead (27) from engine coolant temperature indicator (1).

- (3) Remove two nuts (4) and washers (3) securing mounting clamp (2) and engine coolant temperature indicator (1) to instrument panel (15), and remove clamp and indicator.

b. Inspection and Repair. Check engine coolant temperature indicator as described in electrical troubleshooting (para 2-24). Replace indicator if defective.

c. Installation.

- (1) Position engine coolant temperature indicator (1) on instrument panel (15), position mounting clamp (2) on back of instrument panel, and secure both components with two nuts (4) and washers (3).

- (2) Connect circuit 33 lead (27) and circuit 27B lead (28) to indicator (1).

- (3) Install instrument panel (para 2-92).

2-137. Generator Field Switch

(fig. 2-46).

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect circuit 1B lead (11) and circuit 1A lead (14) at connector on generator field switch (15).

- (2) Remove switch from tee (12) mounted on top of secondary fuel filter (21).

b. Inspection and Repair. Check generator field switch as described in electrical troubleshooting (para 2-21). Replace switch if defective.

c. Installation.

- (1) Install generator field switch (15) with vent downward in tee (12) mounted on top of secondary fuel filter (21).

- (2) Connect circuit 1B lead (11) and circuit 1A lead (14) to connector on switch.

Section XVI. BILGE PUMPS AND RELATED PARTS

2-138. General

a. Scope. This section contains instructions for removal, inspection and repair, and installation of

the bilge pumps and related parts.

b. Description. There are two bilge pumps located in the bilge, one forward and one rear. The

bilge pump wiring interconnects the bilge pumps, bilge pump switch, two circuit breakers, and two indicator lights to the power source. Refer to paragraph 2-26 for troubleshooting the bilge pump electrical system.

2-139. Bilge Pump

(fig. 2-89)

NOTE

Front and rear bilge pumps are removed and installed in a similar manner.

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect circuit 451 lead (1) from rear pump or circuit 452 lead (1) from front pump.

(2) Loosen two hose clamps (6) securing hose (5) to pipe-to-hose adapter (7) and discharge tube, and remove hose.

(3) Remove pump pipe-to-hose adapter (7).

(4) Remove three screws (3) and three key washers (2) from bilge pump straps (4). Remove one screw (10.1), three internal-external tooth lock washers (12), one split lock washer (11), and ground lead (9). Remove two straps (4), cushions (13), and pump (14), with ground strap, from hull. Discard key washers, lock washers, and cushion(s).

(5) Remove two screws (10), internal-external toothed lock washers (12), and one split lock washer (11) securing ground lead (9) and screen (8) to pump (14), and separate ground lead and screen from pump. Discard lock washers.

b. *Inspection and Repair.* Check bilge pump as described in electrical troubleshooting (para 2-26). Replace pump if defective.

c. Installation.

(1) Position pump screen (8) and ground lead (9) on pump (14), and secure with two new internal-external toothed lock washers (12), one new split lock washer (11), and two screws (10).

NOTE

Install one internal-external toothed lock washer between ground lead and screen, and one between ground lead and screw head.

(2) Position pump (14) with screen (8) and ground lead (9) attached. Position two pump straps (4) on pump.

NOTE

Screw (10.1) is the longest of the four pump mounting screws.

(3) Position screw (10.1), new split lock washer (11), three new internal-external toothed lock washer (12), ground lead (9), and strap (4) on weldnut.

NOTE

Install one internal-external toothed lock washer between mounting strap and weldnut, one between ground lead and mounting strap, and one between ground lead and screw head.

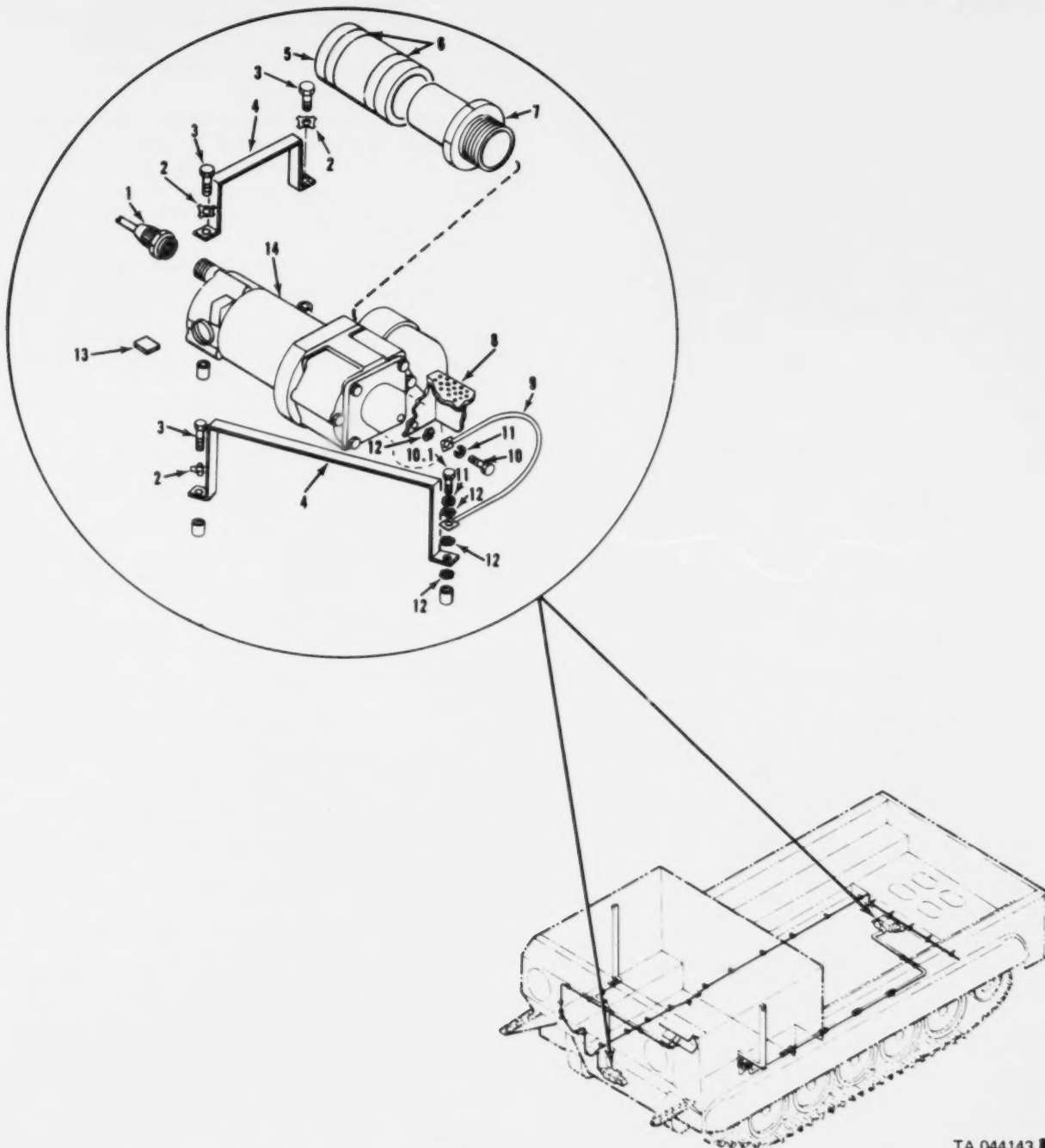
(4) Install screw (10.1) in weldnut.

(5) Position three key washers (2) on straps (4), and install three screws (3). Add cushions to motor end only to insure tight fit between mounting strap and pump.

(6) Install pump pipe-to-hose adapter (7).

(7) Position hose (5) on adapter (7), and secure with two hose clamps (6).

(8) Connect circuit 451 lead (1) to rear pump or circuit 452 lead (1) to front pump.



- 1 Circuit 451 or 452 lead
- 2 Key washer
- 3 Bilge pump strap screw
- 4 Bilge pump strap
- 5 Bilge pump hose

- 6 Bilge pump hose clamp
- 7 Pipe-to-hose adapter
- 8 Bilge pump screen
- 9 Bilge pump ground lead
- 10 Bilge pump screw

- 10.1 Bilge pump strap screw
- 11 Split lock washer
- 12 Internal-external toothed lock washer
- 13 Rubber cushion
- 14 Bilge pump assembly

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Figure 2-89. Bilge pump - exploded view.

2-140. Bilge Pump Tubes, Hoses, and Fittings (fig. 2-90)

a. Removal. Loosen hose clamps, remove tube clamps, and remove tubes, hoses, and fittings.

b. Inspection and Repair.

(1) Inspect tubes for crushed areas and damaged ends. Replace tubes that show either of these defects.

(2) Inspect hoses for cracks and indications of collapse. Replace hoses that show either of these defects.

c. Installation. Position tubes and hoses in carrier, and secure with hose and tube clamps.

Legend to fig. 2-90.

- 1 Front pump hose adapter
- 2 Front pump hose clamp
- 3 Front pump hose

- 4 Front pump tube
- 5 Front pump tube clamp
- 6 Tube clamp retaining screw
- 7 Tube clamp retaining washer
- 8 Rear pump hose clamp
- 9 Rear pump hose
- 10 Tube grommet
- 11 Straight tube
- 12 Tube clamp screw
- 13 Tube clamp washer
- 14 Tube clamp
- 15 Bracket clamp screw
- 16 Bracket tube clamp
- 17 Bracket retaining nut
- 18 Rear pump hose adapter
- 19 Hose elbow
- 20 Rear bent tube
- 21 Center tube elbow
- 22 Bracket screw
- 23 Clamp bracket
- 24 Front bent tube
- 25 Center bent tube
- 26 Bracket clamp nut

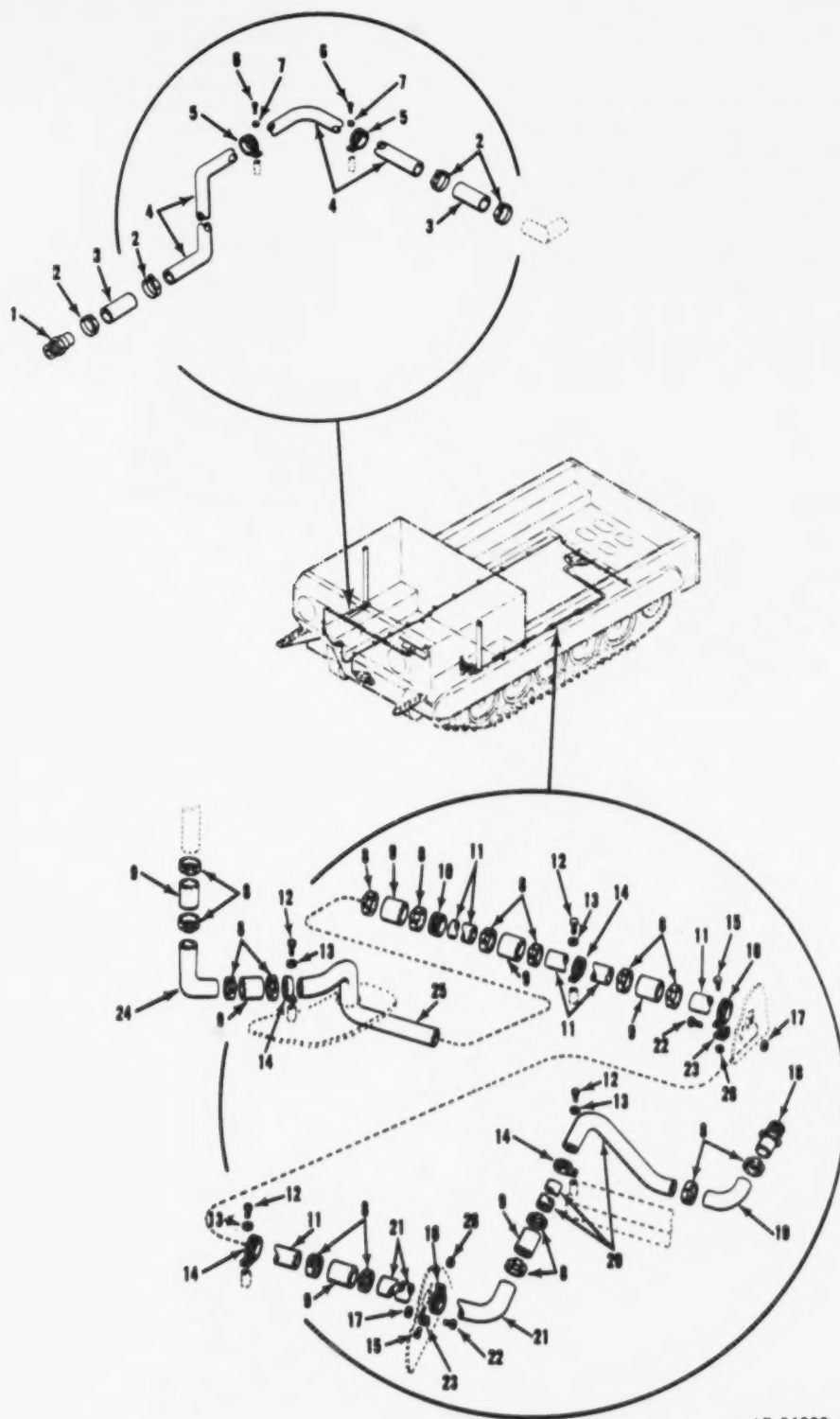


Figure 2-90. Bilge pump tubes, hoses, and fittings.

2-141. Bilge Pump On Indicator Light

a. Removal. Refer to paragraph 2-93 for removal of indicator light.

b. Installation. Refer to paragraph 2-93 for installation of indicator light.

2-142. Bilge Pump On Indicator Light Lamp

a. Removal. Refer to paragraph 2-94 for removal of indicator light lamp.

b. Installation. Refer to paragraph 2-94 for installation of indicator light lamp.

2-143. Bilge Pump Switch

(fig. 2-35)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 450 (34), circuit 450B (13), circuit 451 (33), and circuit 452 (14) leads from switch (15).

(3) Remove two screws (17) and lock washers (16) securing switch (15) to instrument panel (26), and remove switch.

b. Inspection and Repair. Check bilge pump switch as described in electrical troubleshooting (para 2-26). Replace switch if defective.

c. Installation.

(1) Position switch (15) on instrument panel (26) and secure with two lock washers (16) and screws (17).

(2) Connect circuit 450 (34), circuit 450B (13), circuit 451 (33), and circuit 452 (14) leads to switch (15).

(3) Install instrument panel (para 2-92).

2-144. Bilge Pump Circuit Breakers in Battery Box

(fig. 2-36)

NOTE

The front and rear bilge pump circuit breakers are removed and installed in a similar manner.

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Unlock driver's seat clamp, and swing seat forward to expose battery compartment.

(2) Raise center personnel seat section, and secure in raised position.

(3) Disconnect battery negative lead (para 2-98).

(4) Disconnect circuit 450B and 450C leads from front bilge pump circuit breaker or circuit 450 and 450A leads from rear bilge pump circuit breaker.

(5) Remove two screws and nuts securing circuit breaker to bulkhead, and remove circuit breaker.

b. Inspection and Repair. Check circuit breaker as described in electrical troubleshooting (para 2-26). Replace circuit breaker if defective.

c. Installation.

(1) Position circuit breaker on bulkhead, and secure with two screws and nuts.

(2) Connect circuit 450B and 450C leads to front bilge pump circuit breaker or circuit 450 and 450A leads to rear bilge pump circuit breaker.

(3) Connect battery negative lead (para 2-98).

(4) Lower center personnel seat, and secure in lowered position.

(5) Lower driver's seat, and secure with clamp.

Section XVII. RADIO INTERFERENCE SUPPRESSION**2-145. General**

a. Scope. This section contains information on radio interference suppression and instructions for removal and installation of the road wheel and idler wheel suppressor springs.

b. Description. Radio interference suppression is the elimination or minimizing of electrical disturbances which interfere with radio reception. Suppression is accomplished by the use of a static suppressor spring installed in each idler wheel and road wheel. Ground straps and toothed washers are installed where required to eliminate interference. Electrical leads that carry or distribute radio interference signals are shielded.

c. Torque Wrench Specifications. Torque tightness reading for the cover-to-hub assembly mounting screws (fig. 2-91) is 22 to 26 pound-feet torque.

2-146. Static Suppressor Washers and Ground Straps

All electrical connections to the hull of the carrier are separated by internal-external toothed washers and / or terminals of ground straps.

2-147. Road Wheel and Idler Wheel Static Suppressor Springs

(fig. 2-91)

a. Removal.

(1) Drain oil from road wheel or idler wheel (LO 9-1450-585-12).

(2) Remove four screws, and remove cover and gasket from hub assembly. Discard gasket.

(3) Remove and discard spring from hub assembly.

b. Installation.

(1) Position new spring in hub assembly.

(2) Position new gasket and cover on hub assembly, and secure with four screws. Tighten screws to 22 to 26 pound-feet torque.

(3) Fill cover with oil (LO 9-1450-585-12).



Figure 2-91. Road wheel and idler wheel static suppressor springs.

Section XVIII. MISCELLANEOUS RECEPTACLES AND WIRING HARNESS

2-148. General

a. Scope. This section contains instructions for removal, inspection and repair, and installation of miscellaneous receptacles and wiring harness.

b. Description. Miscellaneous receptacles consist of the utility outlet receptacle and trailer electric coupling receptacle. The miscellaneous harness consists of the hull wiring harness and cable.

2-149. Utility Outlet Receptacle

(fig. 2-62)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Partially remove instrument panel (para 2-92).

(2) Disconnect circuit 37 lead (14) from receptacle (15).

(3) Remove cover from receptacle.

(4) Remove two screws (18) and washers (17) securing receptacle and cover and chain (16) to instrument panel (7), and remove and separate receptacle and cover and chain.

b. Inspection and Repair. Check receptacle as described in electrical troubleshooting (para 2-27). Replace receptacle if defective.

c. Installation.

(1) Position receptacle (15) and cover and chain (16) in instrument panel (7), and secure with two screws (18) and washers (17).

(2) Install cover on receptacle.

(3) Connect circuit 37 lead (14) to receptacle.

(4) Install instrument panel (para 2-92).

2-150. Trailer Electric Coupling Receptacle and Cover

(fig. 2-92)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove left stop light-taillight (para 2-120) with housing bracket.

NOTE

It is not necessary to remove left stop light-taillight from housing bracket or to disconnect circuit leads.

(2) Pull stop light-taillight housing bracket out far enough so circuit 21, 22, 23, and 24 leads are visible and accessible.

(3) Disconnect circuit 21, 22, 23, and 24 leads, and remove screw, washer, and nut securing circuit 90 ground lead to hull.

(4) Remove shell and washer from circuit 21, 22, 23, and 24 lead ends, and remove insulation and terminal from circuit 90 ground lead.

(5) Remove connector from hull exterior.

(6) Pull cable through hull, and remove spring and two connectors from cable.

(7) Remove four screws, and remove cover from tailgate.

(8) Remove receptacle, cable, and gasket. Discard gasket.

b. Inspection and Repair.

(1) Check receptacle as described in electric troubleshooting (para 2-27). Replace receptacle if defective.

(2) Inspect cable for frayed, broken, or cracked insulation. If cable is defective, notify direct support maintenance personnel.

(3) Check for damaged connectors and terminals. Replace connectors and terminals if defective.

c. Installation.

(1) Install loose end of receptacle cable in tailgate, position new gasket and receptacle on tailgate, and secure with four screws.

(2) Pull cable through tailgate end, and install connector on tailgate.

(3) Install spring and connector on cable.
(4) Install cable in carrier hull, and pull snug through stop light-tailight opening.

(5) Secure one connector on outside of carrier hull and one connector on tailgate end.

(6) Install insulator and terminal on circuit 90 ground lead, and install shell and washer on circuit 21, 22, 23, and 24 lead ends.

(7) Secure circuit 90 ground lead to hull with screw, washer, and nut.

(8) Connect circuit 21, 22, 23, and 24 leads.

(9) Install left stop light-tailight (para 2-120).



Figure 2-92. Trailer electric coupling receptacle and cover.

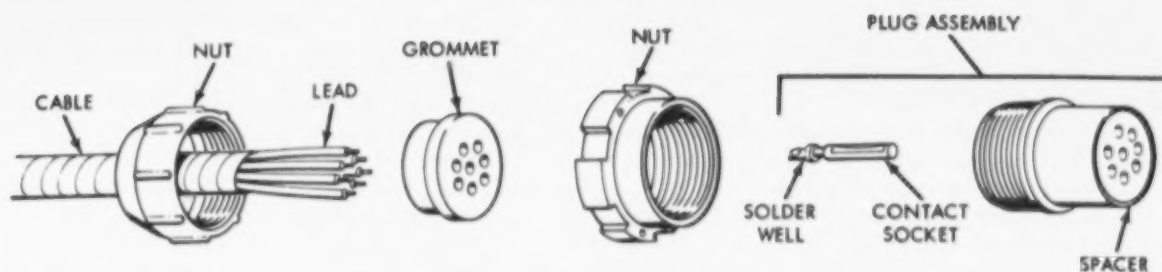
2-151. Hull Wiring Harness and Cables

(fig. 2-93)

a. General. Repair of wiring harnesses and cables is limited to replacing connectors, terminals, and receptacles. General procedures for repairing cables are the same. Place master switch in OFF position before starting repairs. Most cables are repaired without removal from the carrier by disconnecting the connector or terminal to be replaced from its component.

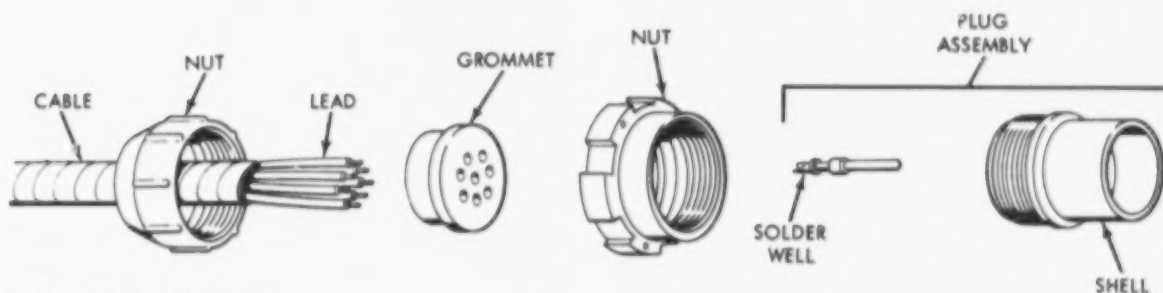
b. Inspection. Examine harnesses and cables for frayed, broken, or cracked insulation. If defective, notify direct support maintenance personnel. Check for damaged connectors or terminals. Replace connectors or terminals that show damage.

c. Repair. See figure 2-93 for repairing wiring harnesses and cables.



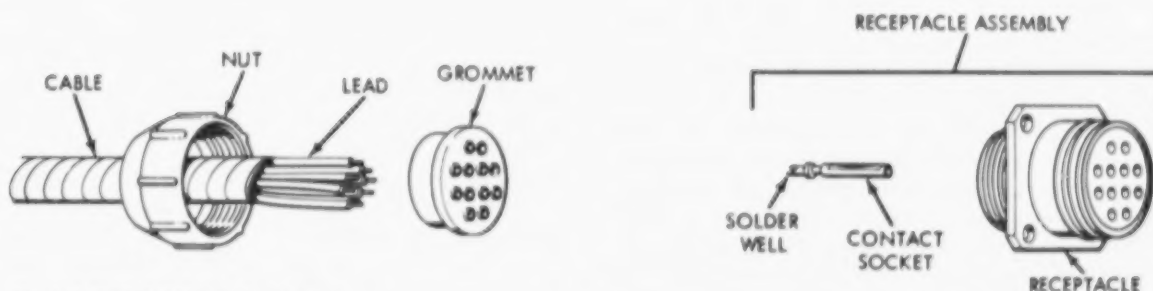
A—FEMALE TYPE PLUG ASSEMBLY

- 1—STRIP LEAD INSULATION EQUAL TO DEPTH OF CONTACT SOCKET SOLDER WELL.
- 2—REMOVE NUT FROM PLUG ASSEMBLY AND SLIDE OVER CABLE.
- 3—REMOVE GROMMET FROM PLUG ASSEMBLY.
- 4—PASS LEAD ENDS THROUGH GROMMET, INSERT INTO CONTACT SOCKET SOLDER WELL, AND SOLDER.
- 5—SLIDE GROMMET OVER CONTACT SOCKET AND PRESS INTO PLUG ASSEMBLY UNTIL SEATED.
- 6—THREAD NUT TO PLUG ASSEMBLY.



B—MALE TYPE PLUG ASSEMBLY

- 1—STRIP LEAD INSULATION EQUAL TO DEPTH OF CONTACT PIN SOLDER WELL.
- 2—REMOVE NUT FROM PLUG ASSEMBLY AND SLIDE OVER CABLE.
- 3—REMOVE GROMMET FROM PLUG ASSEMBLY.
- 4—PASS LEAD ENDS THROUGH GROMMET, INSERT INTO CONTACT PIN SOLDER WELL, AND SOLDER.
- 5—SLIDE GROMMET OVER CONTACT PIN AND PRESS INTO PLUG ASSEMBLY UNTIL SEATED.
- 6—THREAD NUT TO PLUG ASSEMBLY.



C—FEMALE TYPE RECEPTACLE ASSEMBLY

- 1—STRIP LEAD INSULATION EQUAL TO DEPTH OF CONTACT SOCKET SOLDER WELL.
- 2—REMOVE NUT FROM RECEPTACLE ASSEMBLY AND SLIDE OVER CABLE.
- 3—REMOVE GROMMET FROM RECEPTACLE ASSEMBLY.
- 4—PASS LEAD ENDS THROUGH GROMMET, INSERT INTO CONTACT SOCKET SOLDER WELLS, AND SOLDER.
- 5—SLIDE GROMMET OVER CONTACT SOCKETS AND PRESS INTO RECEPTACLE ASSEMBLY UNTIL SEATED.
- 6—THREAD NUT TO RECEPTACLE ASSEMBLY.

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Figure 2-93. Multiple lead connector wiring harness repair (typical).

Section XIX. TRANSMISSION OIL COOLER AND COMPONENTS

2-152. General

a. Scope. This section contains descriptions and instructions for removal, cleaning, inspection and repair, and installation of the transmission oil cooler and components.

b. Description. The transmission is mounted to the transfer gearcase with the input end toward the rear of the carrier. A power takeoff unit is installed on the left side of the transmission to drive the winch. The range selector and accelerator linkage are connected to the right side of the transmission. A cross brace and bracket are mounted above the output universal joint yoke. The transmission oil cooler reduces the temperature of the circulating oil. The oil cooler, located in the lower left side of the engine, consists of an aluminum housing and cover enclosing the transmission and differential oil cooler cores. Oil circulates through each core by entering and leaving through inlet and outlet fittings protruding through the housing cover.

c. Torque Wrench Specifications. Torque tightness reading for the transmission oil high temperature switch (7, fig. 2-94) is 20 to 25 pound-feet torque.

2-153. Transmission Oil Hoses and Fittings (fig. 2-94)

a. Removal.

- (1) Drain transmission (LO 9-1450-585-12).
- (2) Disconnect circuit 327 lead (8) from oil high temperature switch (7), and remove switch from cooler inlet elbow (24) or cooler inlet tee (5).
- (3) Remove screw (12) and washer (13) securing one or two hose clamps (15) and filler tube bracket (14) to transmission, and remove clamp(s) from hose(s).

(4) Remove screw (19) and nut (16) securing single hose clamp (23) or double hose clamp (18) to front hose clamp bracket (17), and remove clamp.

(5) Disconnect transmission-to-cooler hose (1) from cooler inlet elbow (24), and remove hose from transmission outlet elbow (26) or disconnect hose (1) from inlet elbow (6) and transmission outlet adapter (11), and remove hose.

(6) Disconnect cooler-to-transmission hose (3) from cooler outlet elbow (2), and remove hose from transmission inlet elbow (22) or disconnect hose (3) from cooler outlet elbow (2) and transmission inlet adapter (9), and remove hose.

(7) Remove cooler outlet elbow (2) from oil cooler.

(8) Remove cooler inlet elbow (24) or tee inlet elbow (6), cooler inlet tee (5), and cooler inlet nipple (4) from oil cooler.

(9) Remove transmission outlet elbow (26) or transmission outlet adapter (11) and outlet packing (25) from transmission. Discard packing.

(10) Remove transmission inlet elbow (22) or transmission inlet adapter (9) and inlet packing (10) from transmission. Discard packing.

b. Cleaning, Inspection, and Repair.

(1) Clean elbows with dry cleaning solvent (SD) or mineral spirits paint thinner, or by steam cleaning. Dry with clean cloth or compressed air.

(2) Inspect oil hoses for crushed, twisted, broken, or worn condition. Replace hose that shows any of these defects.

(3) Inspect threaded fittings for cracks and damaged threads. Replace fittings that show either of these defects.

c. Installation.

(1) Apply a light coat of sealing compound MIL-S-7916 to external tapered pipe fittings.

(2) Apply a light coat of antiseize compound MIL-A-907 to external straight threaded fittings.

(3) Install new inlet packing (10) and transmission inlet adapter (9) or inlet elbow (22) on transmission.

(4) Install new outlet packing (25) and transmission outlet adapter (11) or outlet elbow (26) on transmission.

(5) Install cooler inlet nipple (4), inlet tee (5), and tee inlet elbow (6) or cooler inlet elbow (24) on engine oil cooler.

(6) Install cooler outlet elbow (2) on engine oil cooler.

(7) Connect cooler-to-transmission hose (3) to transmission inlet adapter (9) and cooler outlet elbow (2) or install hose (3) in inlet elbow (22) and connect hose to cooler outlet elbow (2).

(8) Connect transmission-to-cooler hose (1) to transmission outlet adapter (11) and tee inlet elbow (6) or install hose (1) in transmission outlet elbow (26), and connect hose to cooler inlet elbow (24).

(9) Install single hose clamp (23) on hose (1) or install double hose clamp (18) on hoses (1 and 3), position clamp on bracket (17), and secure with screw (19) and nut (16).

NOTE

If front hose bracket (17) is not installed on transmission, obtain bracket (17), washer (20), screw (21), clamp (23), screw (19), and nut (16) from supply, and install on transmission to prevent damage to hose (1).

(10) Install one clamp (15) on hose (3) or two clamps (15) on hoses (1 and 3), position clamp(s)

(15) and filler tube bracket (14) on transmission, and secure with washer (13) and screw (12).
 (11) Fill transmission (LO 9-1450-585-12).

(12) Start and run engine (TM 9-1450-585-10), and check for oil leaks.



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- 1 Transmission-to-cooler hose
- 2 Cooler outlet elbow
- 3 Cooler-to-transmission hose
- 4 Cooler inlet nipple
- 5 Cooler inlet tee
- 6 Tee inlet elbow
- 7 Oil high temperature switch
- 8 Circuit 327 lead
- 9 Transmission inlet adapter
- 10 Inlet packing
- 11 Transmission outlet adapter
- 12 Filler tube bracket screw
- 13 Filler tube bracket washer

- 14 Filler tube bracket
- 15 Filler tube hose clamp
- 16 Front clamp nut
- 17 Front hose bracket
- 18 Double hose clamp
- 19 Front clamp screw
- 20 Front bracket key washer
- 21 Front bracket screw
- 22 Transmission inlet elbow
- 23 Single hose clamp
- 24 Cooler inlet elbow
- 25 Outlet packing
- 26 Transmission outlet elbow

Figure 2-94. Transmission oil hoses and fittings.

2-154. Deleted

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Figure 2-95. Transmission and differential oil cooler cores.

2-155. Transmission Oil Filter Element

(fig. 2-96)

a. Removal.

NOTE

Place a suitable container under transmission.

- (1) Remove drain plug (4) and allow oil to drain.
- (1.1) Disconnect differential oil pump hose at transfer gearcase.
- (2) Loosen nut (3) securing strap (5).
- (3) Detach strap from bracket (1), and remove cover (2).
- (4) Remove and discard element (7) and gasket (6).

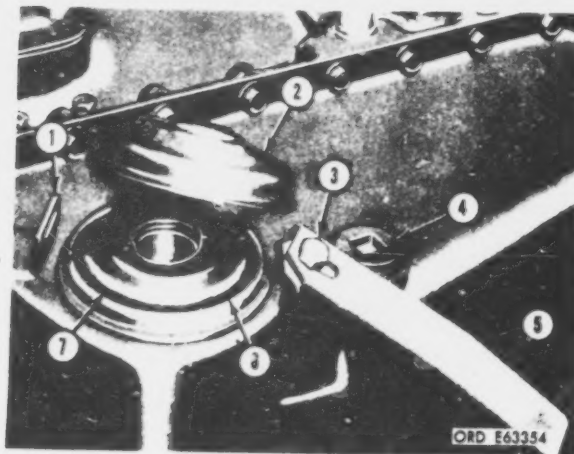
b. Cleaning, Inspection, and Repair.

(1) Inspect cover for cracks or deformation that may cause leakage between transmission pan and cover. Replace cover that shows either of these defects.

(2) Clean cavity with solvent as prescribed in LO 9-1540-585-12.

c. Installation.

- (1) Inset new element (7) in cavity, and install new gasket (6).
- (2) Position cover (2), and attach strap (5) over cover to bracket (1).
- (3) Tighten nut (3) to secure strap and cover.
- (3.1) Connect differential oil pump hose to transfer gearcase.



- 1 Cover retaining strap bracket
- 2 Transmission oil filter element cover
- 3 Retaining strap nut
- 4 Drain plug
- 5 Cover retaining strap
- 6 Oil filter element cover gasket
- 7 Oil filter element

Figure 2-96. Transmission oil filter element.

(4) Install drain plug (4).

(5) Add oil as prescribed in LO 9-1450-585-12, start engine, and check for leaks.

2-156. Transmission Oil Filler Tube, Vent Tube, and Oil Cap with Gage Rod

(fig. 2-97).

a. Removal.

(1) Turn oil filler cap (2) counterclockwise, and remove cap with gage rod.

(2) Disconnect vent tube (4) at vent tube elbow (1) on filler tube (5) and on left side of transmission, and remove vent tube.

(3) Remove elbows (1) from filler tube (5) and transmission.

(4) Remove screw (7), nut (8), and clamp (6) securing filler tube (5) to mounting bracket.

(5) Loosen filler tube nut securing filler tube (5) to transmission, and remove filler tube.

b. Inspection and Repair.

(1) Inspect oil filler tube and oil filler cap with gage rod attached for excessive wear, cracks, and deformation. Replace parts that show any of these defects.

(2) Inspect elbows and nuts for burred or damaged threads. Remove burrs. Replace elbows and nuts that have damaged threads.

(3) Inspect vent tube for cracks, deterioration, and excessive wear. Replace tube that shows any of these defects.

c. Installation.

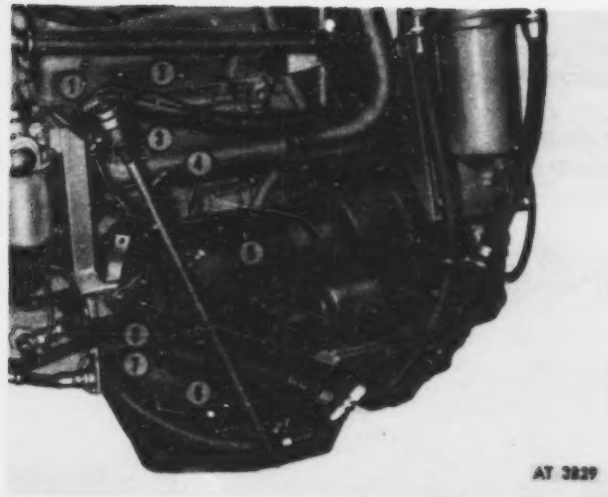
(1) Position filler tube (5) to left side of transmission, and secure with tube nut.

(2) Position filler tube (5) to mounting bracket, and secure with clamp (6), screw (7), and nut (8).

(3) Apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761) to external straight threads, and install two vent tube elbows (1), one on filler tube (5) and one on transmission.

(4) Connect vent tube (4) to elbows (1) on filler tube (5) and transmission.

(5) Position oil filler cap (2) with gage rod in filler tube, and turn cap clockwise to secure.



- 1 Vent tube elbow
- 2 Oil filler cap
- 3 Vent tube nut
- 4 Oil vent tube
- 5 Oil filler tube
- 6 Oil filler tube clamp
- 7 Clamp machine screw
- 8 Clamp self-locking nut

Figure 2-97. Transmission oil filler and vent tube assemblies, oil filler cap, and gage rod.

Section XX. TRANSFER GEARCASE MOUNTS AND OIL HOSE ASSEMBLIES

2-157. General

a. *Scope.* This section contains instructions for removal, inspection and repair, and installation of the transfer gearcase mounts, and oil hose assemblies.

b. *Description.* Refer to paragraph 1-4 for description of the transfer gearcase.

c. *Torque Wrench Specifications.* Refer to table 2-18 for torque tightness readings for the more critical points of the transfer gearcase.

Table 2-18. Transfer Gearcase Components Torque Wrench Specifications

Fig. no.	Key no.	Location	Pound-feet torque
2-98	1	Transfer gearcase left mount nut	75-80
2-100	3	Oil pump flange attaching screw	12-16

2-158. Transfer Gearcase Mounts

(fig. 2-98)

CAUTION

Prolonged operation of engine with the transfer gearcase engaged may cause premature failure of the transfer gearcase.

a. Removal.

(1) Right mount.

(a) Remove power plant (para 2-30).

(b) Early models. Remove cap screw (2), hexagon nut (6), and two flat washers (3), and remove right mount adapter (4).

(c) Late models and M730A1. Remove clip (13) and pin (12) from right mount (4).

(d) If inspection of resilient mount(s) indicates replacement is necessary, remove the mounts with resilient mount remover and replacer (Table B-1).

(2) Left mount.

(a) Remove power plant (para 2-30).

(b) Remove hexagon nut (1), cap screw (7), and two flat washers (8).

(c) Remove two flat washers (9), two resilient mounts (10), and block (11).

b. Inspection and Repair.

(1) Inspect resilient mounts for cracks and deformation. Replace mounts that show either of these defects.

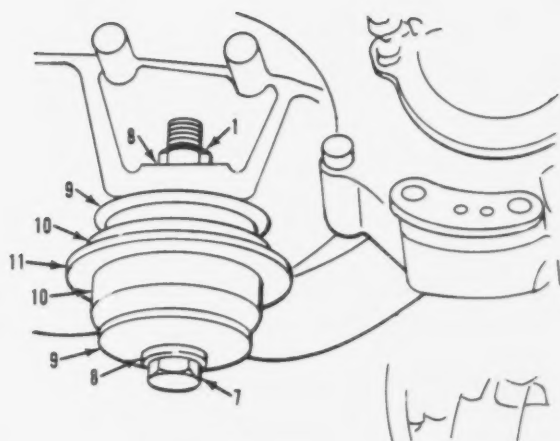
(2) Inspect cap screws for damaged or burred threads. Replace screws that show either of these defects.

c. Installation.

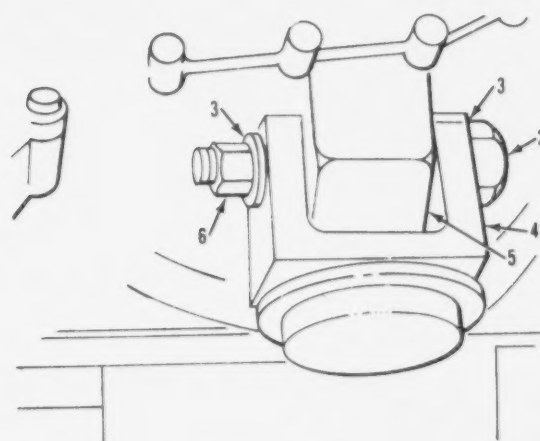
(1) *Right mount.*

(a) Early models. Secure right mount adapter (4) to transfer gearcase with screw (2), two flat washers (3), and nut (6).

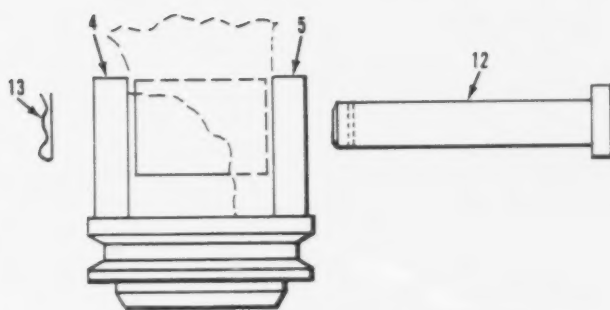
(b) Late models and M730A1. Install pin (12) through gearcase and adapter (4) and secure pin (12) with clip (13).



A — Left mount



B — Right mount - early models



C — Right mount - late models and M730A1

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- | | | |
|---------------------------------------|--|--------------------|
| 1 Left mount hexagon self-locking nut | 6 Right mount hexagon self-locking nut | 10 Resilient mount |
| 2 Right mount adapter cap screw | 7 Left mount cap screw | 11 Block |
| 3 Right mount adapter flat washer | 8 Left mount small flat washer | 12 Pin |
| 4 Right mount adapter | 9 Left mount large flat washer | 13 Clip |
| 5 Resilient mount | | |

Figure 2-98. Transfer gearcase mounts.

(c) Position two flat washers (9), two resilient mounts (10), and block (11) to transfer gearcase, and secure with screw (7), two flat washers (8), and nut (1). Tighten nut to 75 to 80 pound-feet torque.

(d) Install power plant (para 2-30).

(2) *Left mount.*

(a) Apply a light coat of calking compound MIL-C-18969 (8030-00-160-6899) to threads of cap screw (7).

(b) Position two flat washers (9), two resilient mounts (10), and block (11) to transfer gearcase, and secure with screw (7), two flat washers (8), and nut (1). Tighten nut to 75 to 80 pound-feet torque.

(c) Install power plant (para 2-30).

2-159. Deleted

**2-159.1. Transfer Gearcase Filler Neck,
Drain Tube, and Fittings**
(fig. 2-99.1)

a. Removal.

(1) Remove only those parts that inspection shows require replacement.

(2) See figure 2-99.1 for removal of filler neck, drain tube, and fittings.

b. Inspection.

(1) Inspect filler neck for dents, bending, and other damage. Be sure gage rod can be inserted all the way into neck. Replace badly damaged part.

(2) Inspect gage rod to be sure it can be easily read. Straighten rod if it is bent. Replace damaged part.

(3) Inspect drain tube for any damage. Check fittings for damaged threads. Replace damaged tube.

c. Installation.

(1) Apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to external tapered pipe threads after cleaning.

(2) Apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761) to external threads of bolts and straight threaded fittings after cleaning.

(3) See figure 2-99.1 for installation of transfer gearcase filler neck, drain tube, and fittings.

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Figure 2-99. Transfer gearcase oil hoses and fittings.

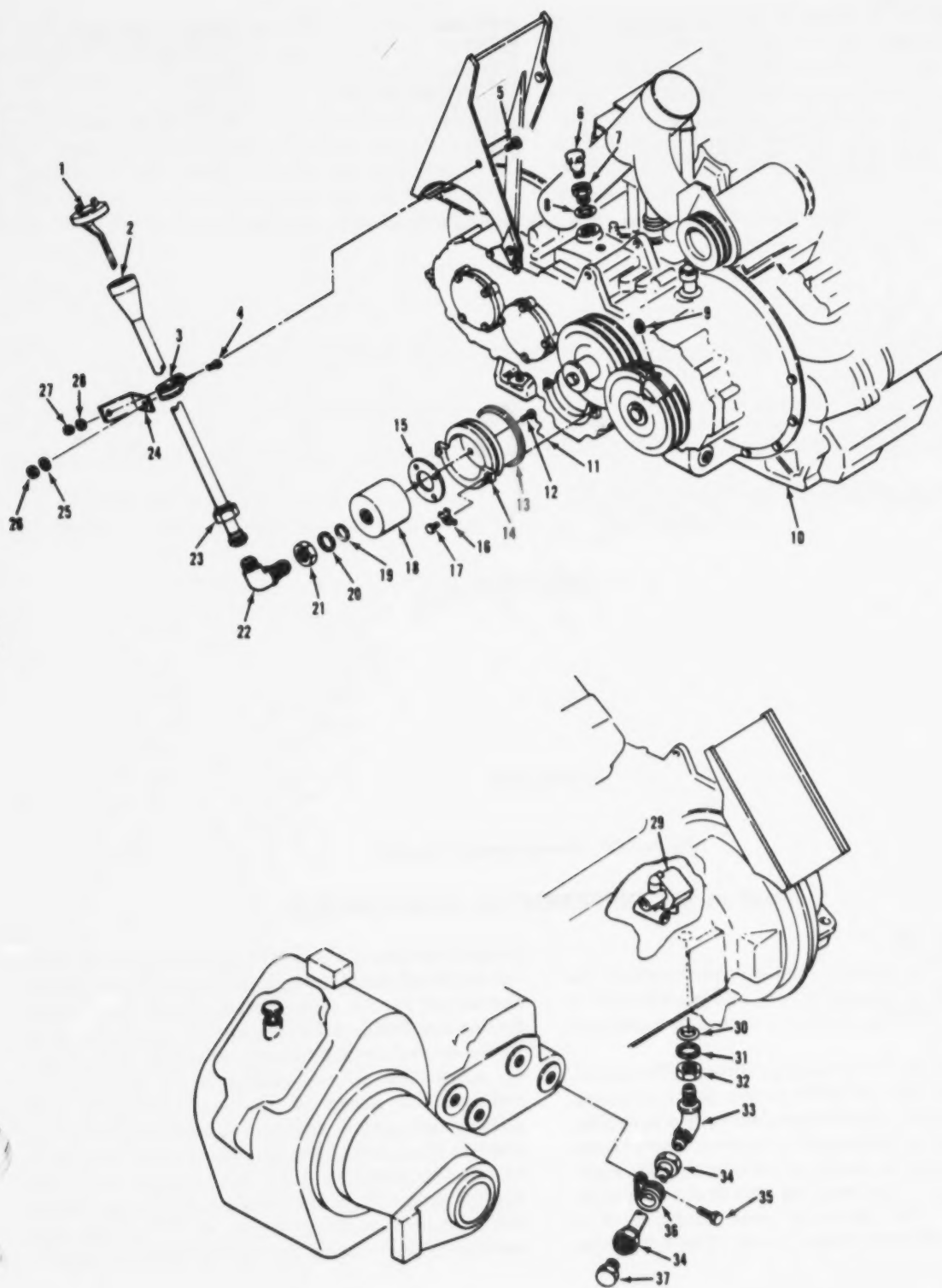


Figure 2-99.1. Transfer gearbox filler neck, drain tube, and fittings.

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Legend to fig. 2-99.1.

1 Gage rod	10 Transfer gearcase	19 Packing	28 Washer
2 Filler neck tube	11 Safety wire	20 Ring	29 Differential pump
3 Clamp	12 Screw	21 Nut	30 Packing
4 Screw	13 Packing	22 Elbow	31 Ring
5 Screw	14 Bracket	23 Filler neck tube nut	32 Nut
6 Breather	15 Gasket	24 Bracket	33 Elbow
7 Adapter	16 Key washer	25 Washer	34 Drain tube
8 Packing	17 Screw	26 Nut	35 Screw
9 Plug	18 Adapter	27 Nut	36 Clamp
			37 Plug

Figure 2-99.1. Transfer gearcase filler neck, drain tube, and fittings — continued.

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Figure 2-100. Transfer gearcase oil pump.

Section XXI. DIFFERENTIAL COMPONENTS

2-161. General

a. *Scope.* This section contains instructions for removal, inspection and repair, and installation of differential oil filter, oil cooler, core, and hoses and fittings.

b. *Description.* The steering control differential, mounted at the front of the power plant compartment, is coupled to the transmission by a propeller shaft and two universal joint spiders. Power from the transmission is transmitted through the right angle gearbox to the steering unit in the differential housing. The steering unit consists of a differential and two brake drums. The left brake

drum connects a planetary gear train to the left output shaft, and the right brake drum is similarly connected to the right output shaft. The brake drums are linked mechanically to steering levers in the driver's cab. Pressure on either lever slows or stops the corresponding brake drum and reduces the speed of the output shaft. The differential action within the steering unit increases the speed of the opposite output shaft and causes the carrier to turn in the direction of the applied brake. Equal pressure exerted simultaneously on both steering levers slows or stops the carrier by preventing further differential action.

The differential oil cooling system controls the differential temperature. The differential oil system consists of a differential oil pump mounted on and driven by the transfer gearcase, an oil filter mounted on the transmission, and an oil cooler core mounted in the engine oil cooler housing. The oil serves the dual function of lubricating and cooling the differential (fig. 2-101.1). The oil is pumped from the differential by the differential oil pump. The oil circulates

through the differential oil filter, passes through the differential oil cooler core, then returns to the differential where it cools the brakes and other moving parts. The oil cooler core is mounted in the engine oil cooler housing. Fitting and hoses mounted externally on the cooler allow oil to pass through and out to the differential. Refer to table 2-19 for torque wrench specifications.

Table 2-19. Differential Torque Wrench Specifications

Fig. No.	Key No.	Location	Pound-foot torque
2-105	5	Differential oil filter body-to-head self-locking nuts.	4-6
2-106	5	Differential oil pump-to-transfer gearcase cap screws.	35-40

NOTE

If inspection of differential resilient mount(s) indicate replacement is neces-

sary, remove with remover and replacer (see Table B-1).

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Figure 2-101. Differential and transfer gearcase oil cooling system.

2-162. Differential Brake Adjustment (fig. 2-102)

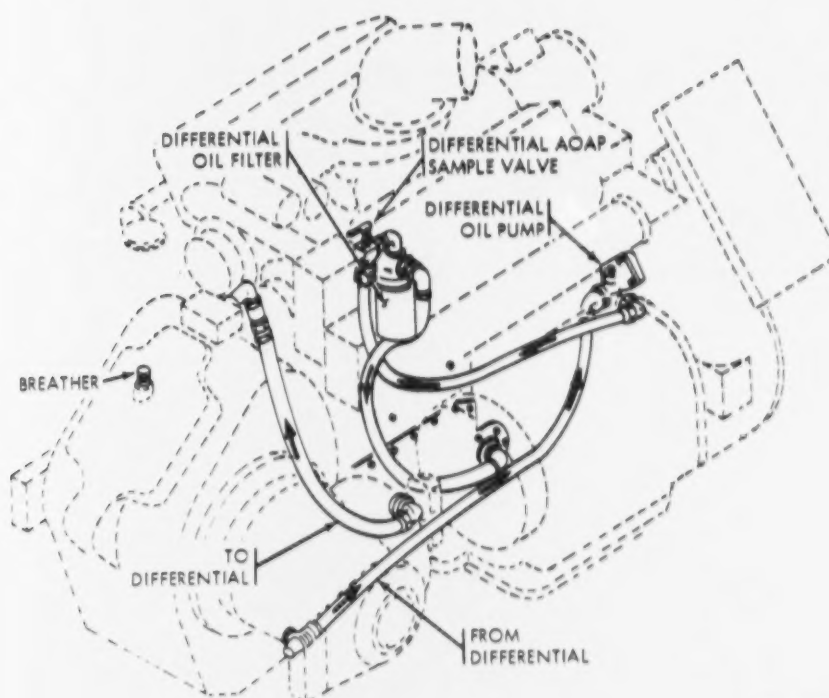
NOTE

Do not adjust brakes when differential is hot; proper adjustment will not be obtained.

CAUTION

Tape socket to extension before adjusting nut. If socket falls into housing the differential could be damaged.

- Park carrier on level surface, and block tracks at front and rear.
- Place differential steering arms in forward released position.
- Remove two differential access plugs.
- Turn each differential brake band adjusting nut one detent at a time, clockwise to tighten band or counterclockwise to loosen band.
- Position steering lever to lock in second notch from front of steering lever quadrant.



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Figure 2-101.1. Differential cooling system

- Measure pressure required to release lever; a pull of 20 to 30 pounds should be obtained.
- Repeat steps *d* through *f* above until correct lever release pressure is obtained.
- After cleaning threads of access plugs, apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761) to threads, and install two access plugs.
- Remove blocks at front and rear of tracks.

NOTE

Do not attempt to adjust steering linkage to compensate for brake band wear; uneven steering lever pull will result.

2-163. Differential Oil Filter (fig. 2-103)

a. Removal.

- Remove drain plug (6, fig. 2-105) at bottom of filter, and drain oil into suitable container.
- Disconnect oil inlet and outlet hoses (para 2-165.1).
- Remove two screws, nuts, and washers securing filter to cross shaft bracket, and remove filter.

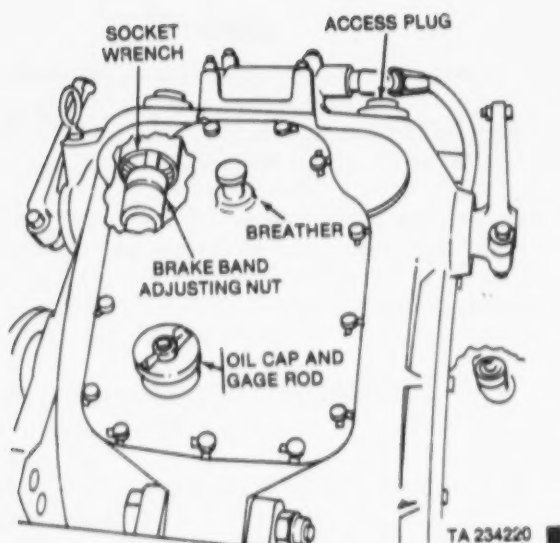


Figure 2-102. Differential steering brakes (early models).

- (4) If replacement filter is to be installed, remove fittings from filter (para 2-165.1).

b. Inspection and Repair.

- (1) Inspect filter for dents or cracks that would cause filter to leak. Replace filter that shows either of these defects.

- (2) Place pressure gage in filter outlet boss, and check opening pressure of bypass valve. Valve should open at 15 psi oil pressure. Replace filter if pressure varies more than 5 psi.

c. Installation.

- (1) If replacement filter is being installed, install fittings on filter (para 2-165.1).

- (2) Position filter to cross shaft bracket, and secure with two screws, nuts, and washers.

- (3) Connect oil inlet and outlet hoses (para 2-165).

- (4) Install drain plug (6, fig. 2-105) at bottom of filter.

- (5) Start and run engine at 1,500 rpm (TM 9-1450-585-10), and check connections for oil leaks.

- (6) Check differential oil level, and add oil as necessary (LO 9-1450-585-12).

2-163.1 Differential oil AOAP sample valve (fig. 2-104.1)

- a. Removal.* Remove valve (7.3), bushing (7.4), and elbow (7.5) from filter assembly (40).

b. Disassembly.

- (1) Remove valve (7.3) from bushing (7.4).

- (2) Remove bushing (7.4) from elbow (7.5).

- c. Inspection and Repair.* Inspect valve, bushing

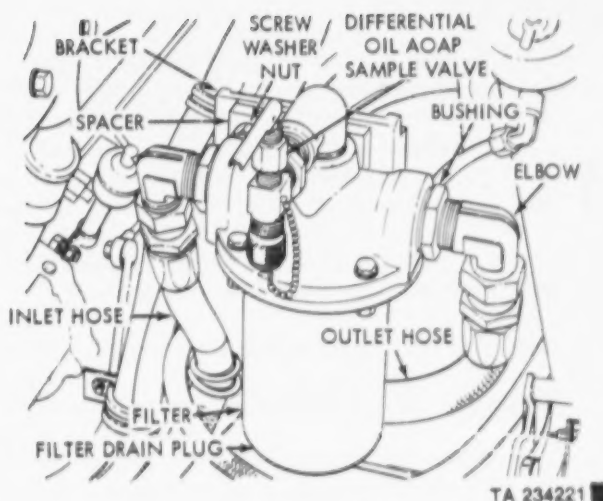


Figure 2-103. Differential oil filter.

and elbow for cracks and damaged threads. Replace any part that shows defects.

d. Assembly.

- (1) Install bushing (7.4) into elbow (7.5).

- (2) Install valve (7.3) into bushing (7.4).

- e. Installation.* Install valve (7.3), bushing (7.4) and elbow (7.5) into filter assembly (40).

2-164. DELETED

2-165. DELETED.

2-165.1. Differential Oil Hoses and Fittings

(fig. 2-104.1)

a. Removal.

NOTE

When removing hoses, revolve hoses to prevent damage from twisting.

- (1) Remove only those hoses that inspection shows require replacement.

- (2) See figure 2-104.1 for removal of differential oil hoses and fittings.

b. Inspection and Repair.

- (1) Inspect hoses for deteriorated areas and breaks. Replace hoses that show either of these defects.

- (2) Inspect fittings for cracks and damaged threads. Replace fittings that show either of these defects.

c. Installation.

CAUTION

Be sure quick-disconnect coupling is properly connected and secured. Improper connection will result in failure of the differential.

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Figure 2-104. Differential oil hoses and fittings.

NOTE

When installing hoses, revolve hoses to prevent damage from twisting.

(1) Clean external threads of tapered pipe fittings, and apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426).

(2) Clean external threads of screws and straight pipe fittings, and apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761).

(3) See figure 2-104.1 for installation of differential oil hoses and fittings.

2-166. Differential Oil Filter Element

(fig. 2-105)

a. Removal.

(1) Remove drain plug (6), and drain oil into suitable container.

(2) Remove four cap screws (1), flat washers (2), and nuts (5) from filter head (3).

(3) Remove filter head (3) from body (4).

(4) Remove element (7), preformed packing (9), and inner preformed packing (8) from body (4). Discard packings.

b. Cleaning, Inspection, and Repair. Inspect filter and filter body for burred or damaged threads, holes, cracks, dirt, and along seating surfaces. Replace filter (para 2-163) that shows any of these defects. Remove burrs. Clean drain plug threads, filter head, filter body, and filter element with solvent (SD).

*c. Installation.***NOTE**

Differential oil filter service kit, containing element and two preformed packings, is required for installation of new filter element if element cannot be cleaned.

(1) Apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to plug threads, and install drain plug (6) in body (4).

(2) Position element (7) in body (4).

(3) Position new preformed packing (9) in filter head (3).

(4) Position new inner preformed packing (8) on element (7).

(5) Position element (7) and inner preformed packing (8) in body (4).

(6) Position body on head (3), and secure with four cap screws (1), flat washers (2), and nuts (5). Tighten nuts to 4 to 6 pound-feet torque.

(7) Check differential oil level (LO 9-1450-585-12).

2-167. Differential Oil Level Gage Rod

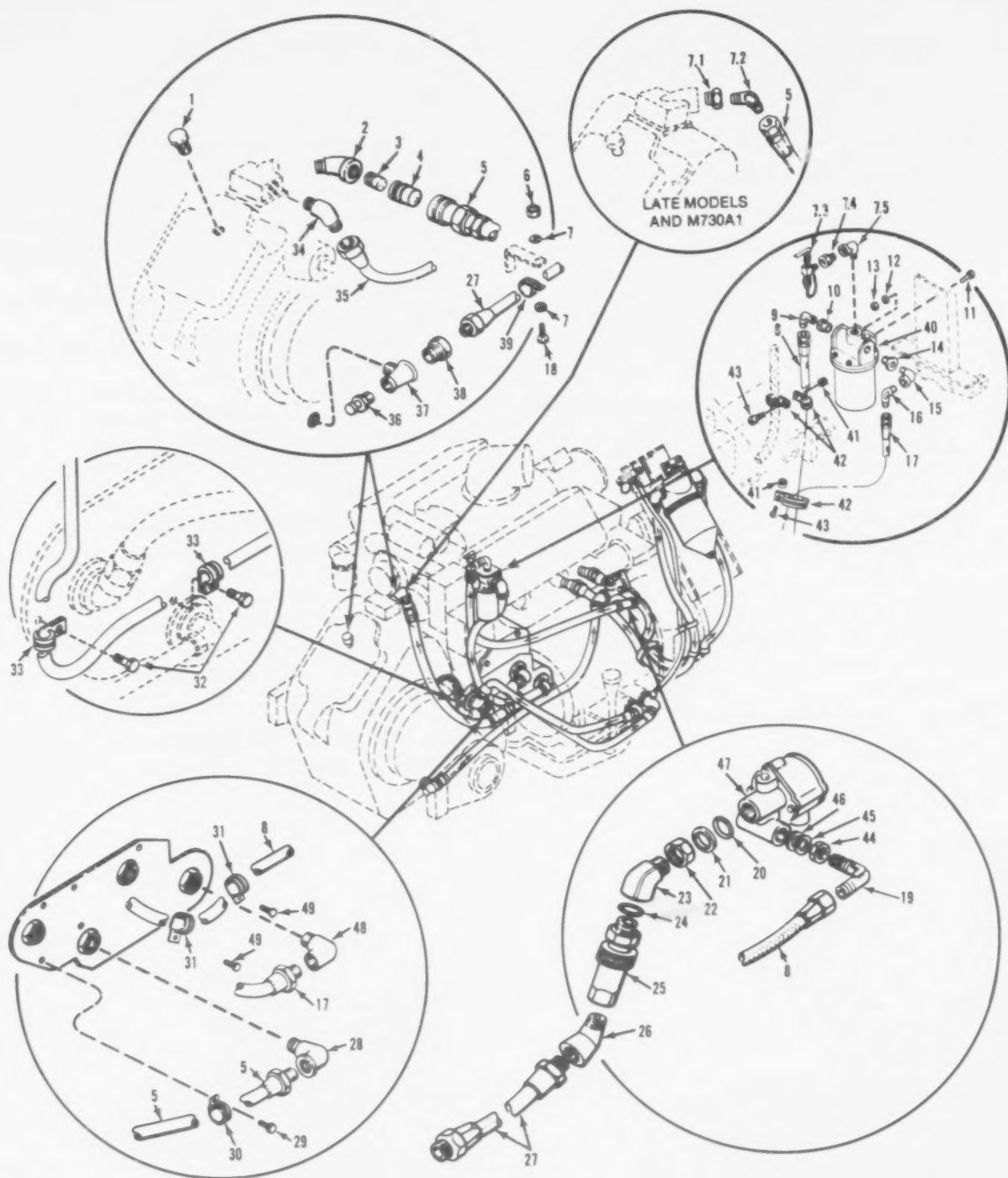
a. Removal. Turn cap counterclockwise, and remove gage rod.

b. Inspection and Repair. Inspect gage rod for cracks, deformation, and difficult seating action. Replace rod if damage cannot be corrected.

c. Installation. Insert gage rod into differential, and turn cap clockwise to secure.

2-168. Differential Oil Breather

a. Removal. Refer to LO 9-1450-585-12.



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Figure 2-104.1. Differential oil hoses and fittings.

Legend to fig. 2-104.1

- | | | | |
|-----|---|----|--|
| 1 | Differential breather | 21 | Pump inlet elbow washer |
| 2 | Differential oil inlet hose elbow | 22 | Pump inlet elbow locknut |
| 3 | Differential oil inlet hose bushing | 23 | Pump inlet elbow |
| 4 | Differential oil inlet hose coupling | 24 | Coupling packing |
| 5 | Oil cooler-to-differential hose assembly | 25 | Outlet hose coupling |
| 6 | Differential oil inlet hose clamp nut | 26 | Differential oil outlet hose elbow |
| 7 | Differential oil outlet hose clamp washer | 27 | Differential oil outlet hose assembly |
| 7.1 | Differential oil inlet hose bushing | 28 | Oil cooler outlet tee |
| 7.2 | Differential oil inlet hose elbow | 29 | Oil cooler-to-differential hose clamp screw |
| 7.3 | AOAP differential oil sample valve | 30 | Oil cooler-to-differential hose clamp |
| 7.4 | AOAP differential oil sample bushing | 31 | Differential oil pump-to-oil filter hose clamp |
| 7.5 | AOAP differential oil sample elbow | 32 | Differential oil filter-to-oil cooler hose clamp screw |
| 8 | Differential oil pump-to-oil filter hose assembly | 33 | Differential oil filter-to-oil cooler hose clamp |
| 9 | Differential oil filter inlet elbow | 34 | Right angle drive gearbox oil hose elbow |
| 10 | Differential oil filter inlet bushing | 35 | Right angle drive gearbox oil hose assembly |
| 11 | Differential oil filter screw | 36 | Differential oil high temperature switch |
| 12 | Differential oil filter washer | 37 | Differential oil hose outlet tee |
| 13 | Differential oil filter nut | 38 | Differential oil outlet hose reducer |
| 14 | Differential oil filter outlet bushing | 39 | Differential oil outlet hose clamp |
| 15 | Differential oil filter outlet 90 degree elbow | 40 | Differential oil filter assembly |
| 16 | Differential oil filter outlet 45 degree elbow | 41 | Differential oil filter hose clamp nut |
| 17 | Differential oil filter-to-oil cooler hose assembly | 42 | Differential oil filter hose clamp |
| 18 | Differential oil outlet hose clamp screw | 43 | Differential oil filter hose clamp screw |
| 19 | Pump outlet elbow | 44 | Pump outlet tee locknut |
| 20 | Pump inlet elbow packing | 45 | Pump outlet tee retaining ring |
| | | 46 | Pump outlet tee packing |
| | | 47 | Differential oil pump |
| | | 48 | Oil cooler inlet elbow |
| | | 49 | Differential oil pump-to-oil filter hose clamp screw |

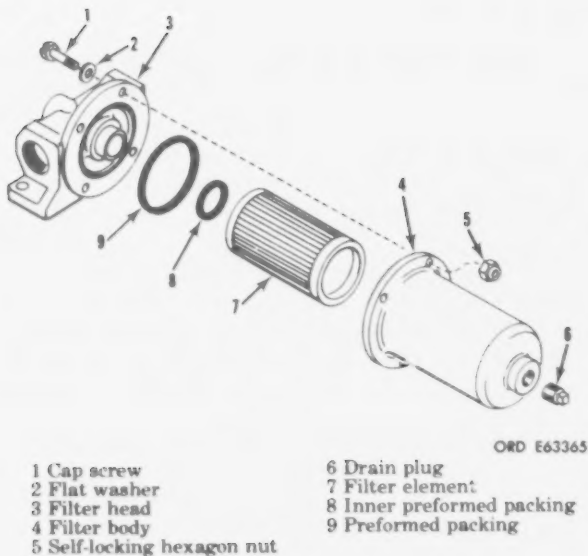


Figure 2-105. Differential oil filter - exploded view.

b. *Cleaning, Inspection, and Repair.* Immerse breather in solvent (SD), and dry with compressed air.

c. *Installation.* Refer to LO 9-1450-585-12.

2-169. Differential Oil Pump

(fig. 2-106)

a. *Removal.*

- (1) Disconnect oil hoses from differential oil pump (para 2-165.1).
- (2) Remove transfer gearcase filler neck and fittings (para 2-159.1).
- (3) Remove cotter pin (4), slotted nut (3), and flat washer(s) (2) securing differential oil pump drive gear in transfer gearcase. Discard cotter pin.
- (4) Remove two screws (5) and key washers (6) securing differential oil pump (7) to transfer gearcase (1), and remove pump and pump gasket (9). Discard key washers and gasket.
- (5) Remove machine key (8) and retaining ring (10) from pump shaft.

b. Inspection and Repair.

(1) Inspect machine key and retaining ring for damage. Replace key and retaining ring if damaged.

(2) Inspect pump for cracked housing, worn or distorted drive shaft, and burred or damaged threads. Replace pump that shows any of these defects.

(3) Test pump with pressure gage for 130 to 170 psi output pressure. If higher or lower pressure is obtained, replace pump or spring and plunger (para 2-170).

(4) Clean pump and cap screw threads.

c. Installation.

(1) Install machine key (8) and retaining ring (10) on differential oil pump shaft.

(2) Apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761) to screw threads.

(3) Position differential oil pump (7) with new gasket (9) in transfer gearcase (1) and in differential oil pump drive gear, and secure with two

screws (5) and new key washers (6). Tighten screws to 35 to 40 pound-feet torque. Bend tabs on key washers to secure screws.

(4) Install washer(s) to secure pump drive gear against retaining ring (10) on pump shaft and slotted nut (3) on pump shaft. Secure slotted nut with new cotter pin (4).

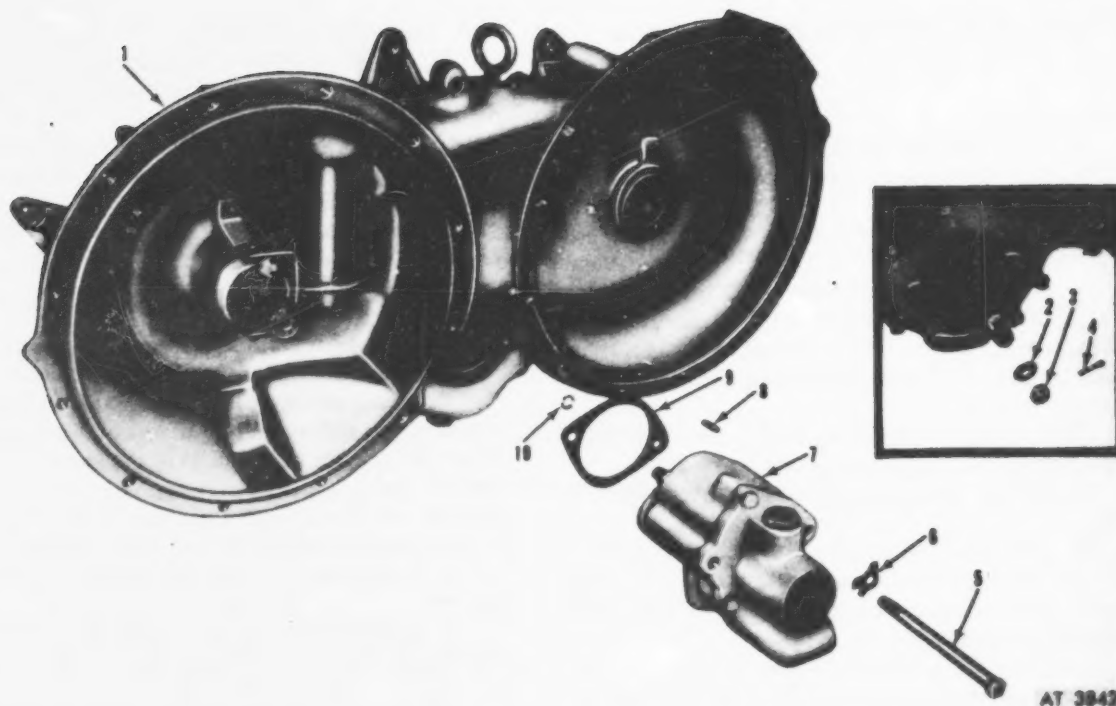
(5) Install transfer gearcase filler neck and fittings (para 2-159.1).

CAUTION

Be sure quick-disconnect coupling is properly connected and secured. Improper connection will result in failure of the differential.

(6) Connect oil hose to differential oil pump (para 2-165).

(7) Start engine (TM 9-1450-585-10), and immediately bring engine speed to 1,200 rpm for approximately 5 seconds to charge system, and check for oil leaks.



- 1 Transfer gearcase
- 2 Flat washer
- 3 Slotted nut
- 4 Cotter pin
- 5 Pump mounting screw

- 6 Key washer
- 7 Differential oil pump
- 8 Machine key
- 9 Oil pump gasket
- 10 Retaining ring

Figure 2-106. Differential oil pump

2-170. Differential Oil Pump Relief Valve (fig. 2-107)

a. Removal and Disassembly.

(1) Remove hull bottom access cover (para 2-223).

(2) Remove plug, and remove spring and plunger.

(3) Remove and discard two packings.

b. *Inspection and Repair.* Test pump with pressure gage for 130 to 170 psi output pressure. If higher or lower pressure is obtained, replace spring and plunger or pump.

NOTE

Pressure relief valve must completely bypass oil at 130 to 170 psi.

c. Assembly and Installation.

(1) Position new packing on plunger, and position new packing on plug.

(2) Insert plunger and spring in pump and secure with plug.

(3) Install hull bottom access cover (para 2-223).

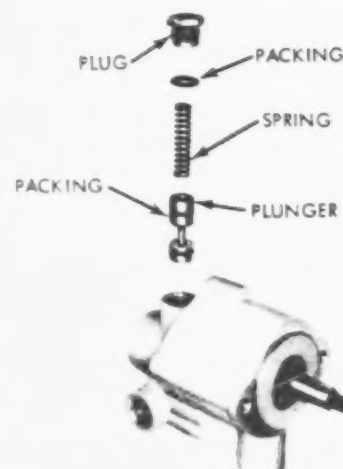


Figure 2-107. Differential oil pump relief valve.

2-170.1. Differential Resilient Mounts (fig. 2-107.1)

a. Removal.

- (1) Drain differential (LO 9-1450-585-12).
- (2) Remove cab cover and frame (TM 9-1450-585-10).
- (3) Remove transverse beam with center seat section (para 2-29).
- (4) Remove winch propeller shaft (para 2-246).
- (5) Disconnect left final drive universal joint plate, right final drive propeller shaft, and transmission-to-differential propeller shaft from differential (para 2-171).
- (6) Disconnect two pivot steer hose assemblies from pivot steer brake assemblies (para 2-206).
- (7) Remove hull bottom access cover (para 2-223).
- (8) Disconnect differential oil outlet hose from differential oil pump. Remove outlet hose mounting clamp, and disconnect differential oil inlet hose from differential (para 2-165.1).
- (9) Remove throttle pedal link from cross shaft on transmission and pedal control arm (para 2-211).
- (10) Remove gear selector link from cross shaft on transmission and gear selector arm (para 2-213).
- (11) Disconnect power plant wiring harness from differential oil high temperature transmitter circuit 328.
- (12) Remove winch transfer gearcase (para 2-245).
- (13) Attach lifting sling 4910-00-646-6893 (17, table 2-1) to differential (fig. 2-107.2), and apply slight tension.
- (14) Remove three screws, six washers, and three nuts or remove three clips and pins securing differential to hull mounts (fig. 2-107.3), and lift differential from carrier.

NOTE

The recessed surface of washer (3) should face resilient mount for removal of mount.

(15) If inspection of resilient mount indicates replacement is necessary, remove mount using remover and replacer 5120-00-740-3346 (13, table 2.1).

(16) Install nut (1), washer (3), and tube (4) on screw (2). Insert screw (2) through resilient mount and install sleeve (5) and nut (1) on screw (2). Tighten nut to remove resilient mount (6) (Fig 2-107.1). Remove remover and replacer (13, table 2-1) and resilient mount from differential.

(17) Repeat step (16) for remaining two resilient mounts.

b. Inspection and Repair.

(1) Inspect resilient mounts for cracks and deformation. Replace mounts that show either of these defects.

(2) Inspect clips and pins for cracks, distortion, and damage. Replace clips and pins that show any one of these defects.

(3) Inspect screws and nuts for damaged threads or cracks. Replace parts that show defects.

c. Installation.

NOTE

The recessed surface of washer (3) should face resilient mount for installation of mount.

(1) Using remover and replacer (13, table 2-1), install nut (1) and washer (3) on screw (2) and position screw (2) through mount hole in differential. Install resilient mount (6), sleeve (5), and nut (1) on screw (2). Tighten nut (1) until resilient mount (6) is in place. Remove remover and replacer from differential.

(2) Repeat step (1) for remaining two resilient mounts.

(3) Attach lifting sling (17, table 2-1) to differential (fig. 2-107.2), and lift differential into carrier.

NOTE

Be certain clip on right mount is positioned on outside of differential as shown in figure 2-107.3.

(4) Position differential into three mounts in hull, and secure with three screws, six washers, and three nuts or three clips and pins (fig. 2-107.3). Remove lifting sling.

(5) Install winch transfer gearcase (para 2-245).

(6) Connect power plant wiring harness to differential oil high temperature transmitter circuit 328 lead.

(7) Install gear selector link to cross shaft on transmission and gear selector arm (para 2-213).

(8) Install throttle pedal link to cross shaft on transmission and pedal control arm (para 2-211).

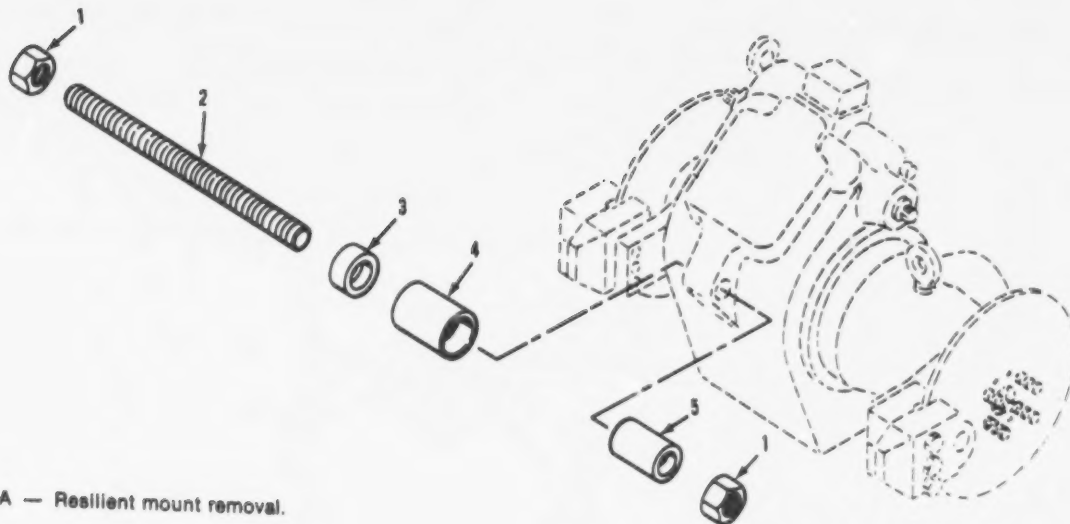
(9) Connect differential oil outlet hose to differential oil pump. Install outlet hose mounting clamp, and connect differential oil inlet hose to differential (para 2-165.1).

CAUTION

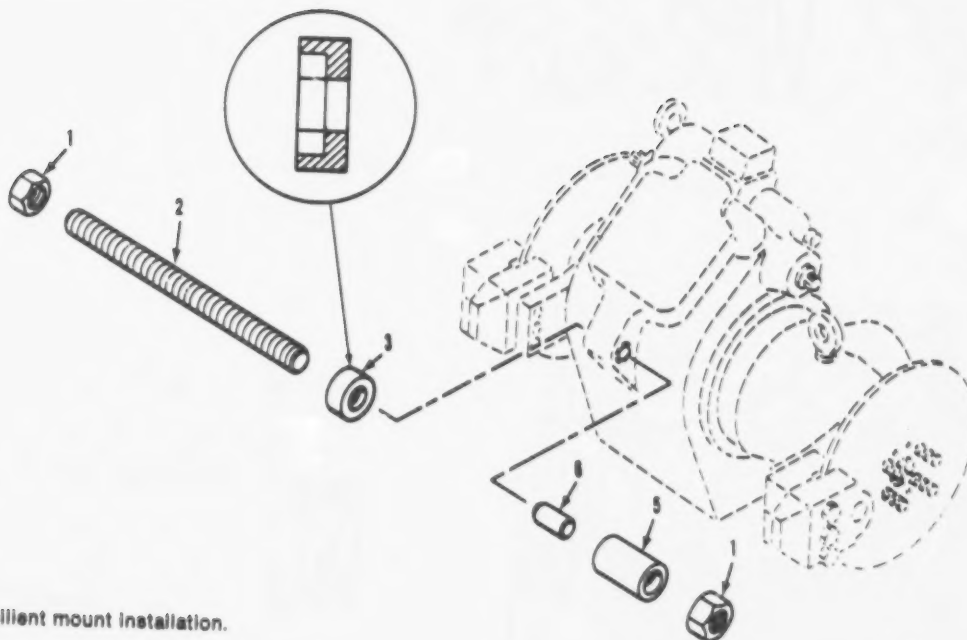
If carrier has differential hose quick disconnect couplings, make certain that differential oil inlet hose couplings are securely and properly connected to prevent oil seal or differential failure.

(10) Install hull bottom access cover (para 2-223).

(11) Connect two pivot steer hose assemblies to pivot steer brake assemblies (para 2-206).



A — Resilient mount removal.



B — Resilient mount installation.

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- | | |
|----------|-------------------|
| 1 Nut | 4 Tube |
| 2 Screw | 5 Sleeve |
| 3 Washer | 6 Resilient mount |

Figure 2-107.1 Differential resilient mounts.

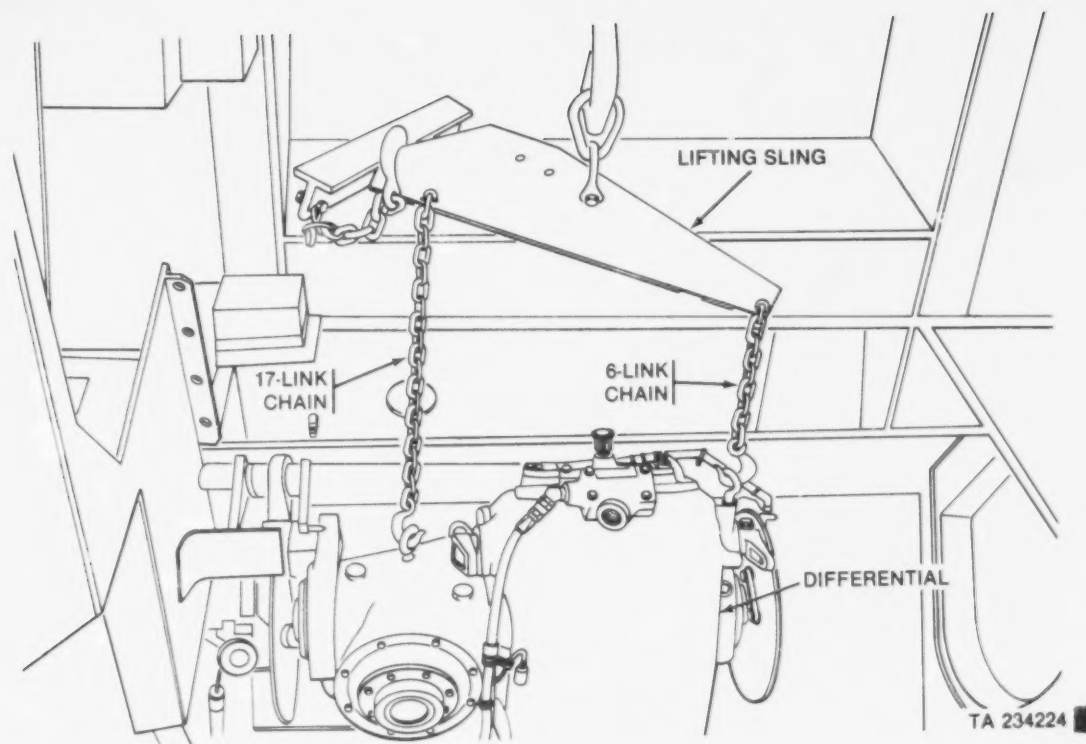
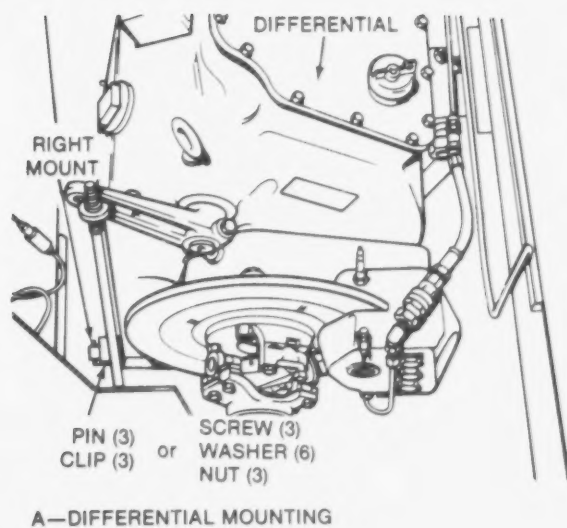
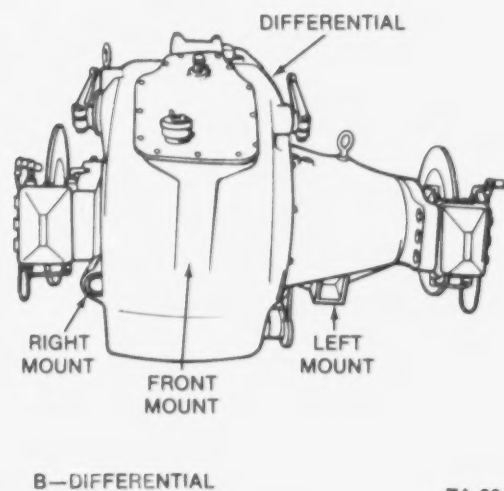


Figure 2-107.2 Using sling to lift differential



A—DIFFERENTIAL MOUNTING



B—DIFFERENTIAL

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Figure 2-107.3 Differential and differential mounts.

(12) Connect left final drive universal joint plate, right final drive propeller shaft, and transmission-to-differential propeller shaft to differential (para 2-171).

(13) Install winch propeller (para 2-246).

(14) Install transverse beam with center seat section (para 2-29).

(15) Install cab frame and cover (TM 9-1450-585-10).

(16) Adjust differential steering brakes and control linkage (para 2-162).

(17) Fill differential oil system in accordance with LO 9-1450-585-12.

Section XXII. PROPELLER SHAFTS, SPIDERS, AND YOKES

2-171. General

a. Scope. This section contains instructions for removal, inspection and repair, and installation of propeller shafts, spiders, and yokes. The final drive gears down shaft revolutions to the proper speed for driving the carrier tracks through sprockets. The power takeoff, when engaged, provides drive through the propeller shaft to the transfer gearcase, which in turn drives the winch.

b. Description. The four propeller shafts and coupled spiders and yokes connect the transmission to the differential, the differential to the two final drives, and the power takeoff on the transmission to the winch transfer gearcase on the hull.

c. Torque Wrench Specifications. Refer to table 2-20 for torque tightness readings for the more critical points of the propeller shafts.

Table 2-20. Propeller Shaft and Final Drive Torque Wrench Specifications

Fig. No.	Key No.	Location	Pound-foot torque
2-108	3	Spider-to-yoke screw	35-40
2-108	4.1	Spider-to-shaft screw	35-40
2-108	7	Spider-to-drive plate screw (6 C U-joint)	35-40
2-109	4	Propeller shaft, spider-to-yoke screw (7 C U-joint)	86-94
2-111		Final drive screws	75-85
2-112		Final drive pinion oil seal screw	21-25

CAUTION

Do not mix the 6 C and 7 C universal joint spiders. The 7 C spiders are mounted between the differential and transmission only. The torque for the 6 C spider screws is 35 to 40 pound-feet and the torque for the 7 C spider screws is 86 to 94 pound-feet.

2-172. Differential-to-Right Final Drive Propeller Shaft, Spiders, and Yokes (fig. 2-108)

a. Removal.

- (1) Raise cab floor plates (para 2-222).
- (2) Remove eight screws (4.1) and washers (4) securing shaft (5) to two spiders (2). Discard screws.
- (2.1) Remove eight screws (3) and washers (4) securing two spiders to yokes (1) and differential adapter plates. Discard screws.
- (3) Lift out two spiders (2) and shaft (5).
- (4) Remove splined yoke (1) from final drive.

b. Inspection and Repair.

NOTE

Contact surfaces of plate, shaft, yokes, screws, and washers must be clean, dry, and free of lubricants and paint.

(1) Inspect shaft, two spiders, and yoke for wear, grooves, scratches, and breaks. Remove scratches and grooves. If scratches and grooves are deep, or parts show excessive wear, replace parts.

(2) Inspect splined yoke for worn, stripped, twisted, chipped, or burred splines. Remove burs. If damage cannot be repaired, replace yoke.

(3) Inspect spider needle bearings for rough and uneven rotation through arc of travel. Replace spiders that have any indication of rough or noisy operation of needle bearings.

c. Installation.

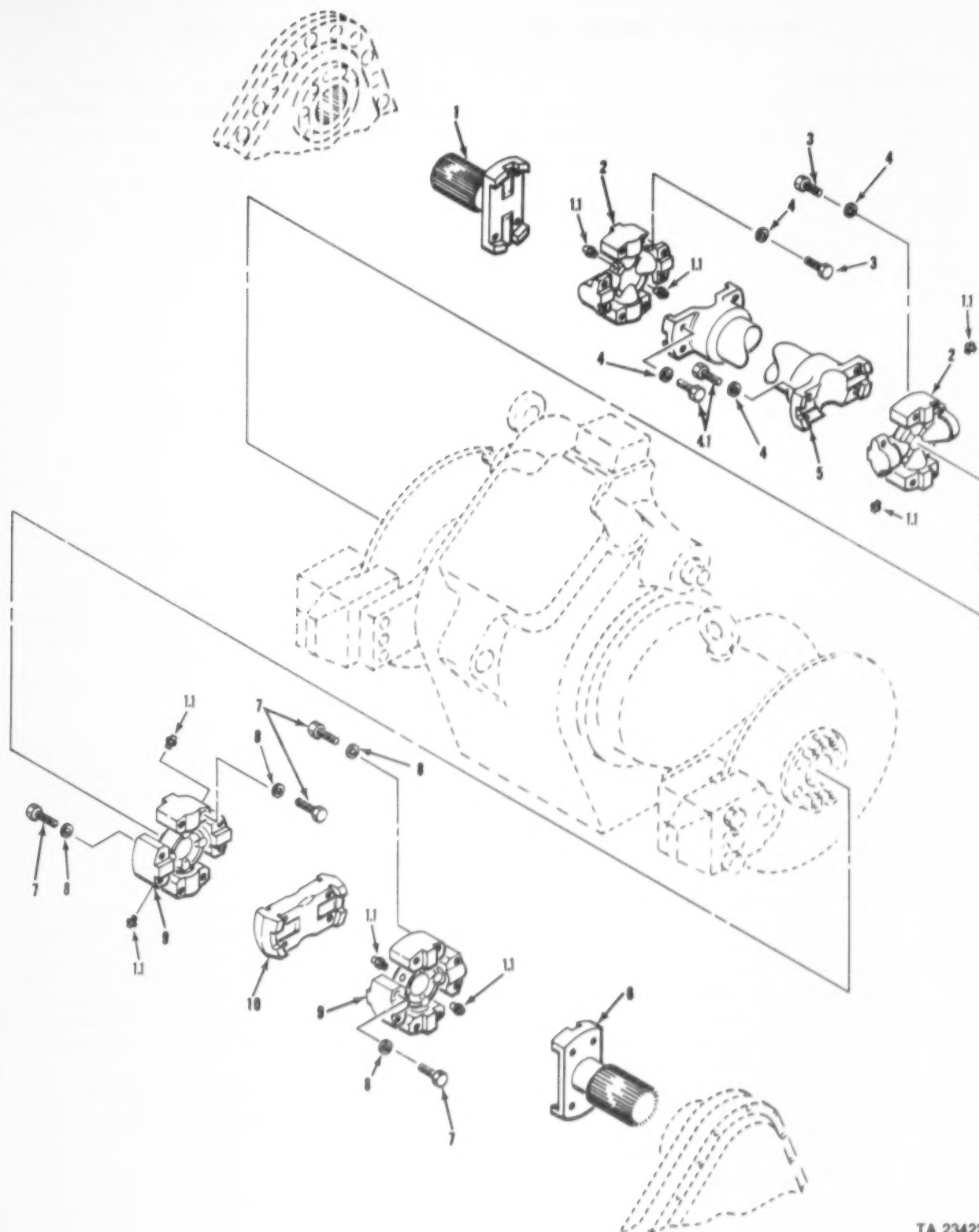
- (1) Install splined yoke (1) in final drive.

NOTE

Do not use torque wrench to loosen bolts.

(2) Position 2 spiders and shaft (5), and secure with 16 washers (4), 8 new screws (3), and 8 new screws (4.1). Tighten screws to 35 to 40 pound-feet torque, loosen with a regular wrench and retorquer with a torque wrench to 35 to 40 pound-feet using torque wrench adapter 5120-00-977-7421 (para 2-222).

- (3) Lubricate spiders during installation.
- (4) Close cab floor plates (para 2-222).



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Figure 2-108. Propeller shafts, spiders, and yokes.

■ Legend to fig. 2-108.

- 1 Right splined yoke
- 1.1 Lubrication fitting (8)
- 2 Right shaft-to-yoke spider
- 3 Mounting screw (8)
- 4 Mounting screw washer (16)
- 4.1 Mounting screw (8)

- 5 Right spider-to-spider propeller shaft
- 6 Left splined yoke
- 7 Mounting screw (16)
- 8 Mounting screw washer (16)
- 9 Left shaft-to-yoke spider
- 10 Plate

2-173. Differential-to-Left Final Drive Plate, Spiders, and Yoke (fig. 2-108)

a. Removal

- (1) Raise cab floor plates (para 2-222).
- (2) Remove 16 screws (7) and 16 washers (8) securing 2 spiders (9) and plate (10). Discard screws.
- (3) Lift out two spiders (9) and drive plate (10).
- (4) Remove splined yoke (6) from final drive.

b. Inspection and Repair. Refer to paragraph 2-172b.

c. Installation.

- (1) Installed splined yoke (6) in final drive.

NOTE

Do not use torque wrench to loosen bolts.

- (2) Position 2 spiders (9) and drive plate (10), and secure with 16 washers (8) and new screws (7). Tighten screws to 35 to 40 pound-feet torque, loosen with a regular wrench and retorque with a torque wrench to 35 to 40 pound-feet using torque wrench adapter 5120-00-977-7421 (fig. 2-110).

- (3) Lubricate spiders during installation.

- (4) Close cab floor plates (para 2-222).

2-174. Transmission-to-Differential Propeller Shaft and Universal Joint Spider (fig. 2-109)

a. Removal

- (1) Remove 16 screws (4) and 16 washers (3) securing 2 spiders (2). Discard screws.
- (2) Lift out two spiders (2) and propeller shaft (5).
- (3) Remove splined yoke (1) from differential.

b. Inspection and Repair.

- (1) Inspect propeller shaft, spiders, and yoke for wear, grooves, scratches, and breaks. Remove scratches and grooves. If scratches and grooves are deep, or parts show excessive wear, replace parts.

- (2) Inspect splined yoke for worn, stripped, twisted, chipped, or burred splines. Remove burrs. If damage cannot be repaired, replace yoke.

- (3) Inspect spider needle bearings for rough and uneven rotation through arc of travel. Replace spiders that have any indication of rough or noisy operation of needle bearings.

c. Installation.

- (1) Install splined yoke (1) in differential.

NOTE

Do not use torque wrench to loosen bolts.

- (2) Position 2 spiders (2) and propeller shaft (5), and secure with 16 washers (3) and 16 new screws (4). Tighten screws to 35 to 40 pound-feet torque, loosen with a regular wrench and retorque with a torque wrench to 35 to 40 pound-feet using torque wrench adapter 5120-00-977-7421.

2-174.1. Transmission-to-Differential Propeller Shaft and 7C Universal Joint Spider (fig. 2-109)

a. Removal

- (1) Position vehicle so spider-to-yoke screws (4) are in 12 o'clock position.
- (2) Loosen four screws (4) and washers (3) securing spiders (2) to transmission and differential yokes (1).

NOTE

To gain access to transmission yoke screws, remove differential oil filter assembly from bracket.

- (3) Move vehicle and position remaining spider-to-yoke screws (4) at 12 o'clock position.

- (4) Remove eight screws (4) and washers (3) securing shaft assembly to transmission and differential yokes (1). Remove assembly and discard screws.

- (5) Remove eight screws (4) and washers (3) securing spiders to shaft (5). Remove assembly and discard screws.

b. *Inspection and Repair.* Refer to paragraph 2-172b.

c. *Installation.*

NOTE

Do not use a torque wrench to loosen bolts.

(1) Install spiders (2) to shaft (5) and secure with eight new screws (4) and washers (3). Apply 86 to 94 pound-feet torque to screws, loosen with a regular wrench and retorque screws with a torque wrench to 86 to 94 pound-feet. Use torque wrench adapter 5120-00-213-6976 if necessary to torque screws.

(2) Position the shaft assembly on the transmission and differential yokes (1). Secure with eight new screws (4) and washers (3). Apply 86 to 94 pound-feet torque to top four screws, loosen with a regular wrench and retorque screws with a torque wrench to 86 to 94 pound-feet torque.

(3) Move vehicle and position remaining screws (4) at 12 o'clock position. Apply 86 to 94 pound-feet

torque to screws, loosen and retorque screws to 86 to 94 pound-feet. Use torque wrench adapter 5120-00-213-6976 if necessary to torque screws

(4) Install differential oil filter assembly.

2-175. Final Drives (fig. 2-111)

a. Removal.

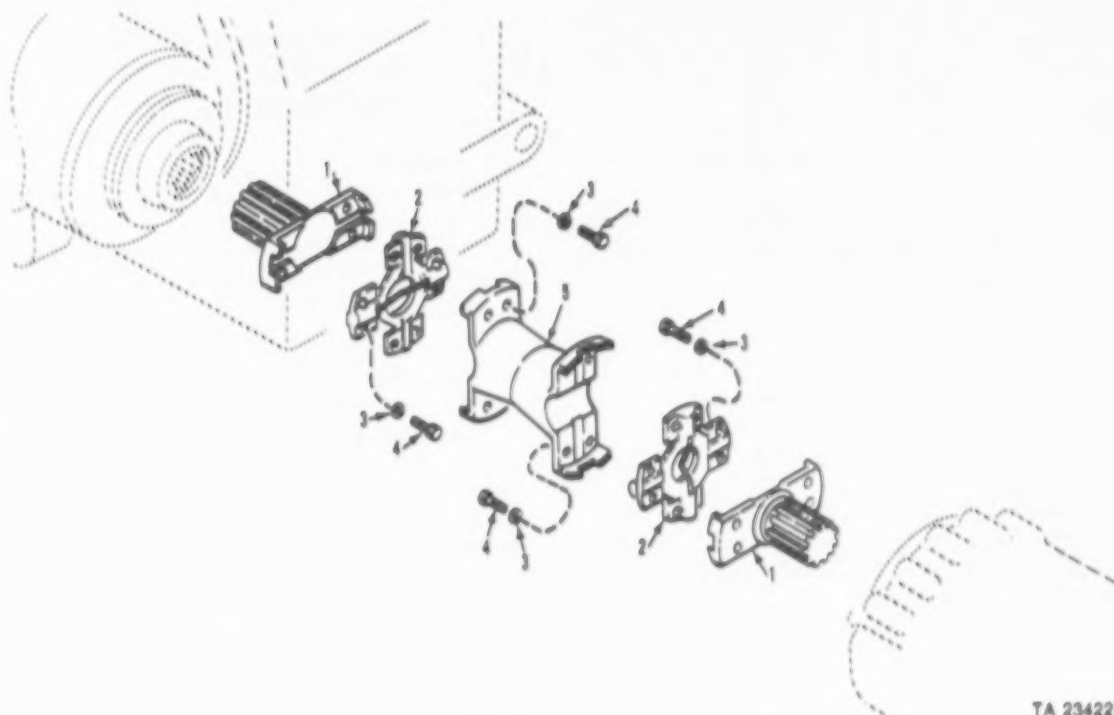
(1) Remove track shroud (para 2-184).

(2) Relieve tension on track (TM 9-1450-585-10).

(3) Lift track from drive sprocket assembly.

(4) Remove drive sprocket assembly (para 2-187).

(5) If right final drive is to be removed, remove right final drive propeller shaft (para 2-172). If left final drive is to be removed, remove left final drive plate, spiders, and yoke (para 2-173).



1 Yoke
2 Spider
3 Key washer

4 Spider screw
5 Propeller shaft

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Figure 2-109. Transmission-to-differential propeller shaft.



NOTE. THROTTLE FLOOR PLATE AND STEERING CONTROLS REMOVED FOR CLARITY

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Figure 2-110. Tightening universal joint screws.

(6) If left final drive is to be removed, disconnect speedometer flexible shaft at final drive (para 2-256), and remove clamp securing filler tube to hull bracket.

(7) Drain final drive (LO 9-1450-585-12).

(8) Position final drive lifting bar 5120-918-0586, and secure with two screws.

(9) Remove 17 screws and washers, and remove final drive.

NOTE

If left final drive is to be replaced, remove speedometer drive adapter (para 2-259).

b. Inspection and Repair.

(1) Inspect final drive for cracked housing, leaking gaskets, and leaking input and output shaft seals. Replace defective seals.

(2) Inspect vent tube for cracks and leaks. Replace defective tube (para 2-178).

(3) Inspect mounting surfaces and internal spline for excessive wear, breaks, nicks and burs. Remove nicks and burs. If damage cannot be repaired, replace final drive.

c. Installation.

(1) If replacement final drive is being installed, perform the following procedure to provide seal lubrication during initial startup.

(a) Add 3 pints of oil (OE) to final drive.

(b) Position final drive to allow oil to flow to seal, and maintain this position for 10 minutes.

(2) If left final drive is being replaced, install speedometer drive adapter (removed from replaced final drive) on replacement final drive (para 2-259).

(3) Position final drive lifting bar 5120-918-0586, and secure to final drive with two screws.

(4) Hoist final drive into position, and secure with 17 screws and washers. Apply a light coat of antiseize compound MIL-A-907 (8030-00-059-2761)

to threads of screws. Tighten screws to 75 to 85 pound-feet torque.

(5) Remove two screws, and remove sling from final drive.

(6) Install and tighten drain plug, and lubricate final drive (LO 9-1450-585-12).

(7) If left final drive is being installed, connect speedometer flexible shaft (para 2-256), and install clamp securing filler tube to hull bracket.

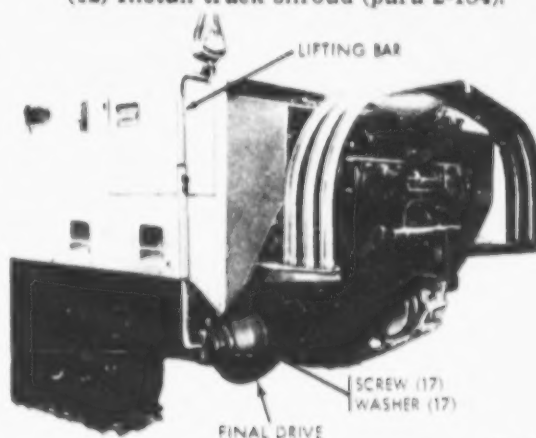
(8) If right final drive was removed, install right final drive propeller shaft (para 2-172). If left final drive was removed, install left final drive plate, spiders, and yoke (para 2-173).

(9) Install drive sprocket assembly (para 2-187).

(10) Connect track (TM 9-1450-585-10).

(11) Adjust track tension (TM 9-1450-585-10).

(12) Install track shroud (para 2-184).



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Figure 2-111. Using final drive lifting bar.

2-176. Final Drive Pinion Oil Seal (fig. 2-112)

a. Removal.

(1) Remove propeller shaft (para 2-172) or drive plate, spiders, and yoke (para 2-173).

(2) Remove locking wire or six key washers. Discard locking wire or washers.

(3) Remove six screws, retainer, seal, and gasket.

(4) Remove and discard seal and gasket.

b. Inspection and Repair.

(1) Replace gasket and seal to insure proper sealing.

(2) Inspect retainer shaft end contact and mounting surfaces for nicks, scratches, and burs. Remove defects. If scratches and nicks are deep, replace retainer or final drive.

c. Installation.

(1) Apply sealing compound MIL-S-7916 (8030-00-845-3499) to outer circumference, and install new seal flush with outer surface of retainer.

threads. Place clamp (3) on filler tube assembly (13), and secure clamp with new key washer (15) and screw (14).

(5) Tighten locknut (17) on elbow (7), and connect vent tube (5) to filler tube.

(6) Place clamp (11) on filler tube (12), and install filler tube in filler tube assembly (13).

(7) Secure clamp (11) to hull bracket with screw (10) and nut (9).

(8) Install gage rod (2) in filler tube (12).

(9) Install final drive (para 2-175).

(10) Connect speedometer flexible shaft (para 2-256).

(11) Install left final drive universal joint plate (para 2-173).

(12) Install drive sprocket assembly (para 2-187).

(13) Position track on drive sprocket assembly.

(14) Connect track (TM 9-1450-585-10).

(15) Adjust track tension (TM 9-1450-585-10).

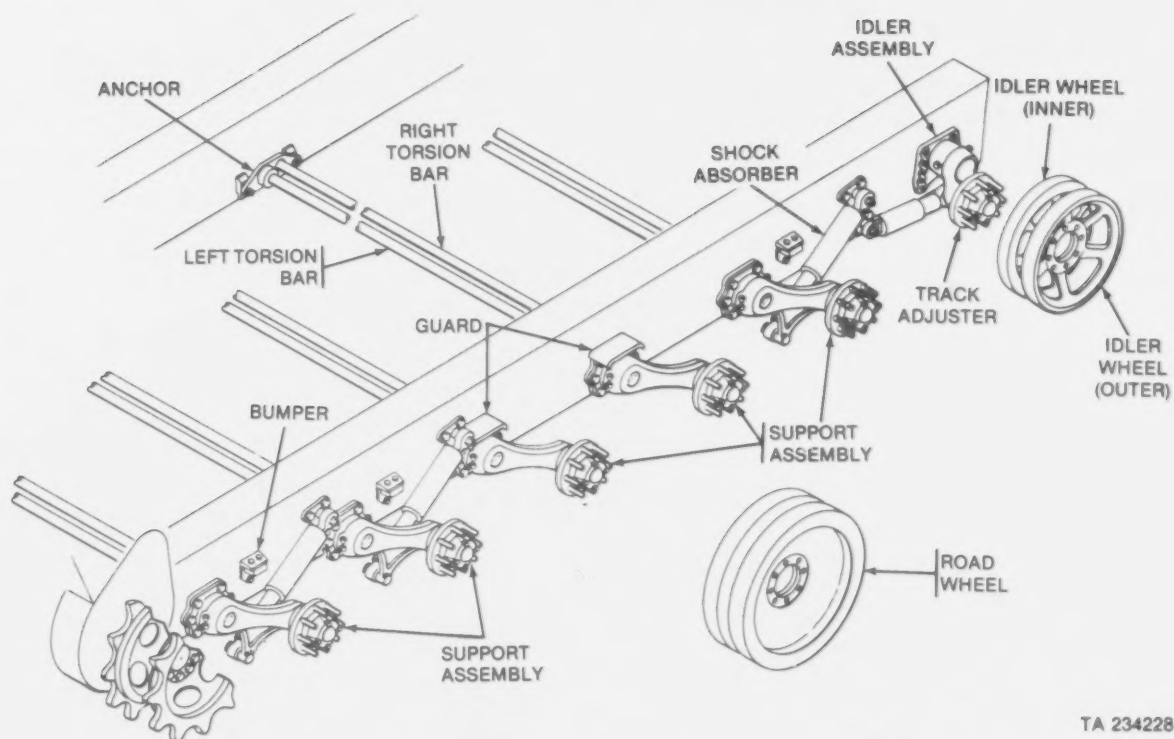
(16) Install track shroud (para 2-184).

Section XXIII. TRACKS AND SUSPENSION

2-179. General

a. Scope. This section contains instructions for removal, cleaning, inspection and repair, and

installation of tracks and suspension components described in *b* below, and instructions for con-



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Figure 2-114. Improved suspension (M730A1).

version to GAA lubrication of track idler wheel arm assembly and road wheel support arm assembly.

b. Description. The suspension system consists of 10 dual road wheels mounted on road wheel support arms; each arm is splined to a torsion bar. Each torsion bar is splined into a torsion bar anchor, bolted to the opposite side of the carrier hull. Road shocks, forcing the road wheels upward, are absorbed by the counter twisting action of the torsion bars. Shock absorbers are provided for each front and rear road wheel support arm (M730) and front, second, and rear road wheel support arm (M730A1). Two tracks, each driven by a track drive sprocket secured to a final drive, provide the surface on which the road wheels roll. Track tension is maintained by two track adjusters, which actuate two dual idler wheels.

c. Torque Wrench Specifications. Refer to table 2-21 for torque tightness readings for the more critical points of the track and suspension system.

2-180. Adjustment of Tracks

Refer to TM 9-1450-585-10.

2-181. Inspection of Track Shoes

a. General. Refer to table 2-22 for track shoe wear limits and see figure 2-115 for track shoe points of measurements.

b. Track Shoe Bushings. Inspection of track shoe bushings should be made with the track under normal track tension (TM 9-1450-585-10). Insert the two pins of gage 5120-01-041-9920 into the bushing housing of two track shoes. If the pins can be inserted into the bushing housings at the shortest distance, then the bushings are OK (fig. 2-114.1).

Table 2-21. Track and Suspension Torque Wrench Specifications

Fig. No.	Key No.	Location	Pound-foot torque
2-130	..	Torsion bar plug	50-75
2-130	..	Torsion bar screw	60-70
2-130	..	Torsion bar anchor screws	315-325
Par. 182c		Track pin nuts	115-135

NOTE
MEASUREMENT MUST BE TAKEN OF STRAIGHT PORTION OF TRACK (AS SHOWN). DO NOT GAGE PORTIONS OF TRACK GOING AROUND THE DRIVE SPROCKET, IDLER ASSEMBLY, OR ROAD WHEEL.

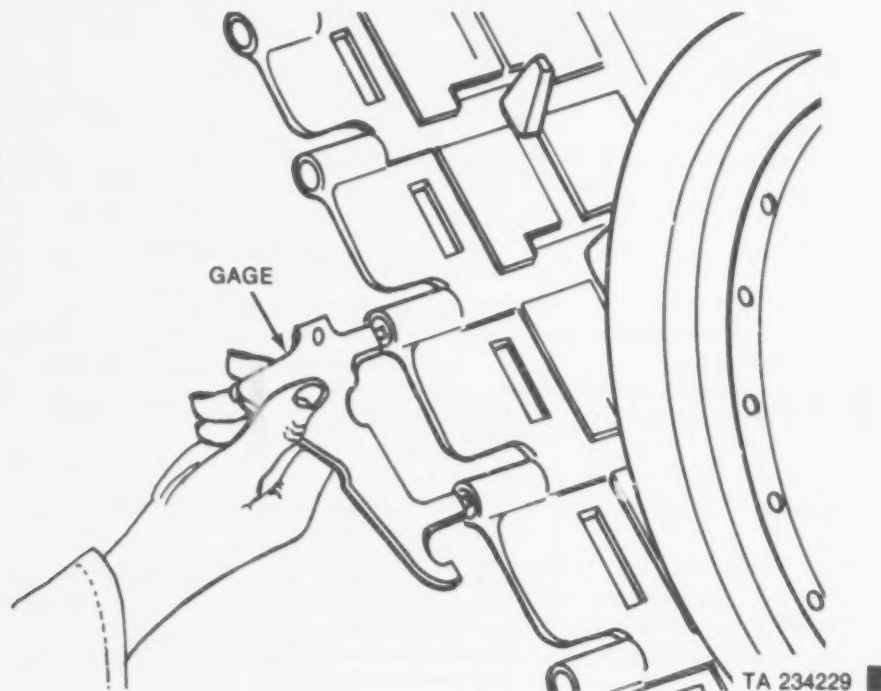
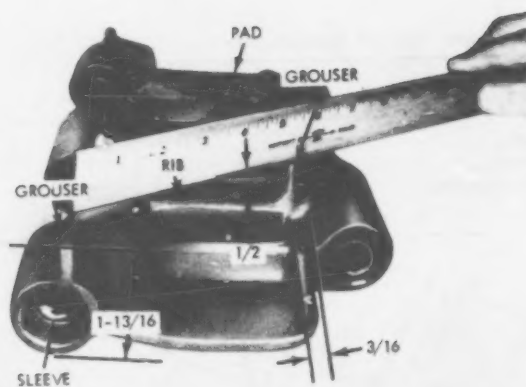


Figure 2-114.1. Measuring bushing wear with gage.

NOTES

1. ALL DIMENSIONS SHOWN ARE IN INCHES.
2. REFER TO TABLE 3-3 FOR WEAR LIMITS.
3. MEASURE BUSHING WEAR WITH TRACK UNDER NORMAL TENSION ON VEHICLE OR WITH TRACK LYING ON THE GROUND, BY DRAGGING TRACK A SHORT DISTANCE TO TENSION BUSHINGS.
4. GROUSER, PAD, CENTER GUIDE, AND RUBBER INSERT WEAR CAN BE MEASURED WITH TRACK INSTALLED ON VEHICLE (TRACK SHOES ARE SHOWN REMOVED FOR CLARITY ONLY).
5. GROUSER DIMENSION MARKED * MUST BE MEASURED WITH SHOE REMOVED FROM TRACK.

A-Deleted.



B-MEASURING TRACK SHOE GROUSER AND SPROCKET FLANGE WEAR

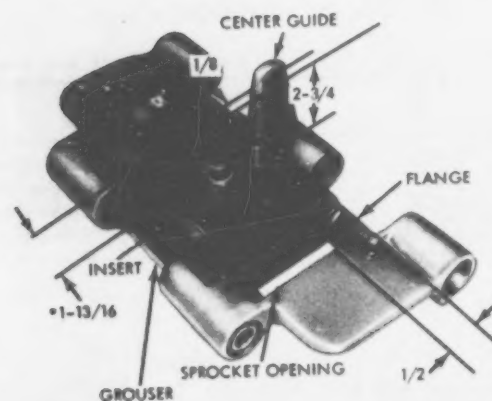
C-MEASURING TRACK SHOE CENTER GUIDE GROUSER, AND SPROCKET FLANGE WEAR
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Figure 2-115. Measuring track shoe wear.

Table 2-22. Track Shoe Wear Limits

Portion of shoe	Point of measurement	Serviceable	Unserviceable
Bushings (fig. 2-114.1)	Shortest distance between housings	Gage fits freely.	Gage does not fit.
Grousers.	a. Height of grouser from raised ribs on each side of track (B, fig. 2-115). b. Height of grouser from bottom of track shoe (B, fig. 2-115). Shoe must be removed to measure height of grouser on two bushing ends of shoe (C, fig. 2-115).	a. $\frac{1}{2}$ inch or more. b. $1\frac{13}{16}$ inches or more.	a. Less than $\frac{1}{2}$ inch. b. Less than $1\frac{13}{16}$ inches.

Table 2-22. Track Shoe Wear Limits—Continued

Portion of shoe	Point of measurement	Serviceable	Unserviceable
Center guide (C, fig. 2-115).	Height and thickness of center guide.	More than $2\frac{3}{4}$ inches high and more than $\frac{1}{8}$ inch thick.	Less than $2\frac{3}{4}$ inches high and $\frac{1}{8}$ inches thick, or broken.
Drive sprocket flanges (B and C, fig. 2-115).	a. Thickness of flanges on two bushing ends. b. Thickness of flanges on three bushing ends.	a. $3/16$ inch or more. b. $\frac{1}{2}$ inch or more.	a. Less than $3/16$ inch. b. Less than $\frac{1}{2}$ inch.
Forgings (fig. 2-115).	Visual inspection.	Cracks less than 1 inch long in grousers, pad recess, and inner and outer ears, and sides of sprocket openings (repairable by welding).	Cracks in corners of sprocket openings, center guide base, and bushing bores, or any crack over 1 inch long.
Rubber inserts—road wheel surface of shoes (C, fig. 2-115).	Visual inspection.	$5/16$ inch or less insert and metal, completely around insert; and "chunking" less than $\frac{1}{2}$ inch in depth covering less than 10 percent of insert surface.	More than $5/16$ inch separation between insert, and metal completely around insert; or "chunking" more than $\frac{1}{2}$ inch in depth exceeding 10 percent of insert surface.
Track shoe pad (B, fig. 2-115).	Height of pad from top of grousers.	$1/16$ inch or more.	Less than $1/16$ inch or "chunking" in excess of $\frac{3}{4}$ inch in depth exceeding 10 percent of pad surface.

2-182. Track

NOTE

If carrier power is to be used when installing track, remove only one track at a time.

a. Removal.

(1) Remove track shroud (TM 9-1450-585-10).

(2) Relieve track tension, and disconnect track (TM 9-1450-585-10). If track pin is difficult to remove, use puller and adapter (table 2-1) to remove track pin.

(3) Remove track as follows:

(a) Start engine.

(b) Place range selector in R, and pull back steering lever on same side as track to be removed.

(c) Drive carrier slowly in reverse and guide track over road wheels and idler wheels.

(d) After carrier has cleared track, place range selector in N, and stop engine.

b. Inspection. Refer to para 2-181.

c. Disassembly and Assembly. Refer to TM 9-1450-585-10.

d. Installation.

NOTE

If track shoe bushings cause interference during track assembly, reposition track shoe bushings (e below).

(1) Lay track out flat in front of carrier so

that track guides are aligned between first pair of road wheels.

(2) Install track as follows:

(a) Start engine.

(b) Place range selector in 1 drive range, and pull back steering lever on same side as track to be installed.

(c) Pull rear end of track up and over idler wheel, and drive carrier forward while pulling track over road wheels and drive sprocket.

(d) Drive carrier slowly forward on track until hub of front road wheel is directly over third track shoe from the front.

(3) Connect track and tighten track pin nuts to 115 to 135 pound-feet torque; and adjust track tension (TM 9-1450-585-10).

(4) Install track shroud (TM 9-1450-585-10).

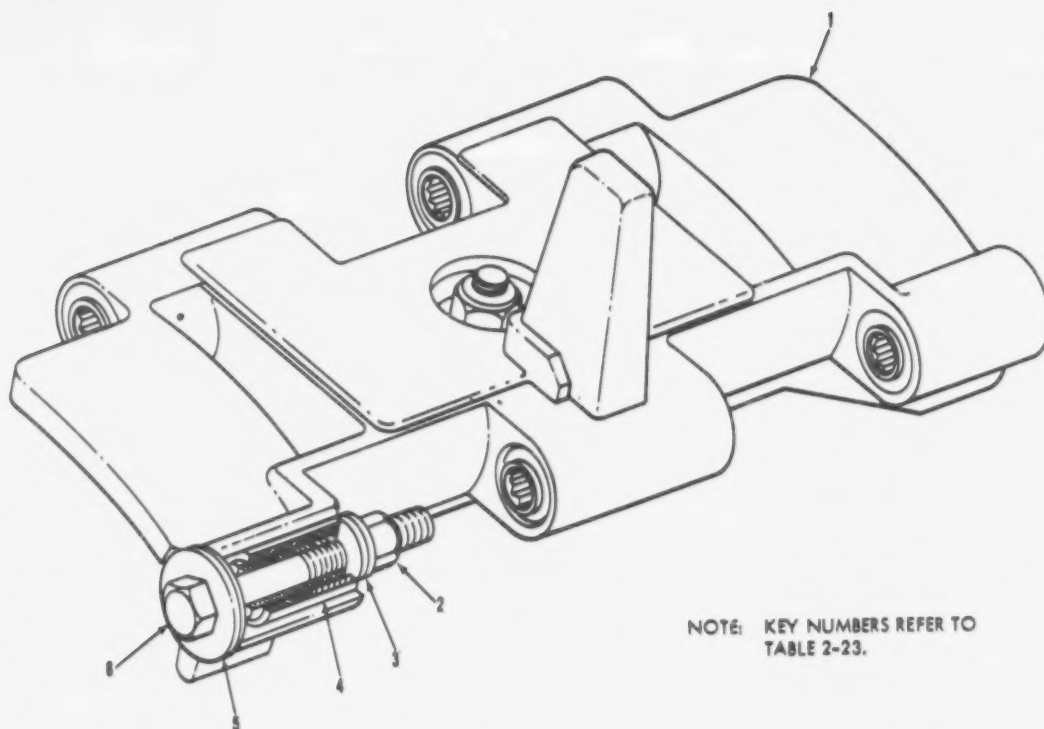
e. Repositioning Track Shoe Bushing (fig. 2-116).

(1) Refer to table 2-23 for a listing of parts required to reposition track shoe bushings.

(2) Install two flat washers (5) on cap screw (6), install cap screw in bushing (4) from outboard end of track shoe (1), and install two washers (3) and nut (2).

(3) Tighten nut (2) to press bushing (4) into track shoe bore until centered in bore.

(4) Remove and retain nut (2), two washers (3), two washers (5), and cap screw (6).



NOTE: KEY NUMBERS REFER TO
TABLE 2-23.

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Figure 2-116. Positioning bushings in track shoe bore.

Table 2-23. Track Shoe Bushing Positioning Parts

Part number	Qty	Fig. Key	Description
MS27183-18	2	3	Flat washer, steel, cadmium plated, general purpose - 0.531 id x 1.062 od x 0.095 thk.
MS27183-22	2	5	Flat washer, steel, cadmium plated, general purpose - 0.688 id x 1.750 od x 0.134 thk.
MS51967-14	1	2	Hexagon nut, plain, carbon, steel, cadmium plated, 1/2-UNC-2B.
MS90725-122	1	6	Cap screw, hexagon head, steel, grade 5, cadmium plated, 1/2-UNC-2A x 3 3/4.
		4	Bushing (Ref).
		1	Track shoe (Ref).

2-183. Track Shroud Cover

(fig. 2-118)

a. Removal.

(1) Position track connecting fixture 5120-073-9736 as shown in figure 2-117 in hole of rear cover (4, fig. 2-118). Tighten fixture to relieve pressure on rear cover to hull cap screws (6).

(2) If rear cover (4) is to be removed:

(a) Remove four cap screws (6) and washers (5) securing rear cover (4) to hull, and remove track connecting fixture.

(b) Remove four cap screws (8) and washers (7) securing rear cover (4) and clamp (3).

(3) If front cover is to be removed:

(a) Remove four screws (13) and washers (14) securing front cover (15) to hull.

(b) Remove four screws (12) and washers (11) securing front cover (15) to shroud (1), and remove front cover (15) and clamp (3).

b. Inspection and Repair. Inspect covers for bends, dents, and cracks. Straighten bends and dents. Weld cracks (para 2-269).

c. Installation.

(1) If front cover is to be installed:

(a) Remove four screws (6) and washers (5), and separate rear cover (4) from hull.

(b) Position front clamp (3) and front cover (15) to shroud (1), and secure with four washers (11) and screws (12).

(c) Position front cover to hull, and secure with four washers (14) and screws (13).

(d) Position track connecting fixture 5120-073-9736 as shown in figure 2-117. Tighten fixture until four screw holes of rear cover (4, fig. 2-118) are alined with mating holes in hull.

(e) Secure rear cover to hull with four washers (5) and screws (6). Remove track connecting fixture.

(2) If rear cover is to be installed:

(a) Position rear clamp (3) and rear cover (4) to shroud (1), and secure with four washers (7) and screws (8).

(b) Position track connecting fixture 5120-073-9736 as shown in figure 2-123. Tighten fixture until four screw holes of rear cover are alined with mating holes in hull.

(c) Secure rear cover to hull with four washers (5) and screws (6). Remove track connecting fixture.

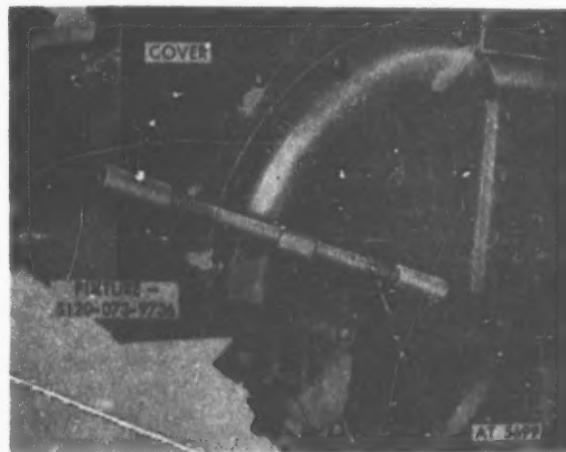
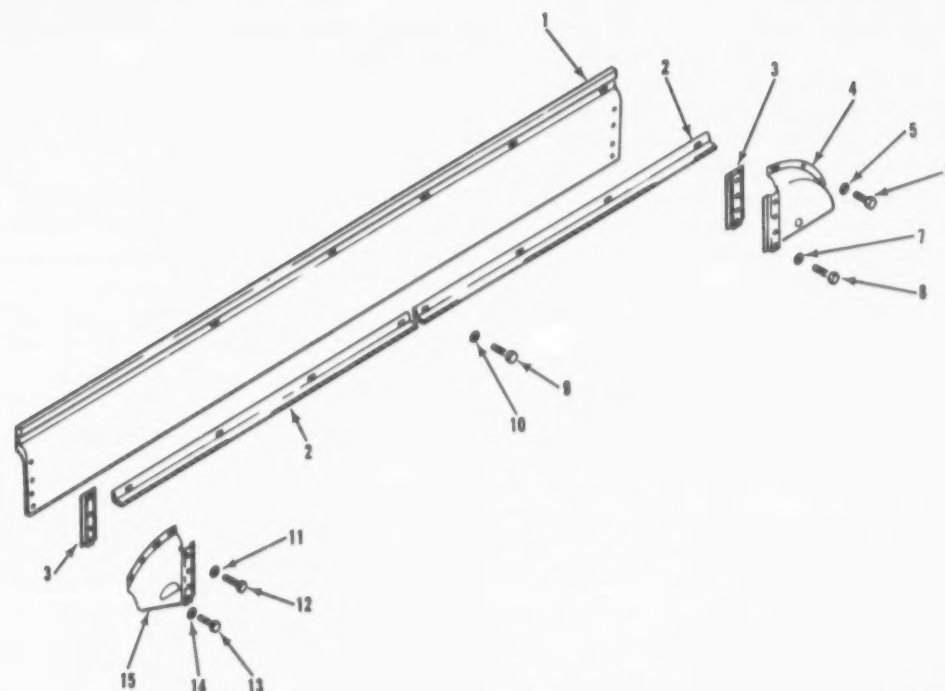


Figure 2-117. Removing rear cover using track connecting fixture.



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- 1 Track shroud
- 2 Shroud clamp
- 3 Front and rear cover clamp
- 4 Rear cover
- 5 Rear cover flat washer

- 6 Rear cover cap screw
- 7 Rear cover and clamp flat washer
- 8 Rear cover and clamp cap screw
- 9 Track shroud cap screw
- 10 Track shroud flat washer

- 11 Front cover flat washer
- 12 Front cover cap screw
- 13 Front cover and clamp cap screw
- 14 Front cover and clamp flat washer
- 15 Front cover

Figure 2-118. Track shroud and cover—exploded view.

2-184. Track Shroud (fig. 2-118)

a. Removal.

(1) Position track connecting fixture 5120-073-9736 as shown in figure 2-117. Tighten fixture to relieve pressure, and remove four screws (6, fig. 2-118) and washers (5) securing rear cover (4) to hull. Remove track connecting fixture.

(2) Remove four screws (8) and washers (7), and remove rear cover (4) and clamp (3) from track shroud (1).

(3) Remove four screws (12) and washers (11), and separate front cover (15) from shroud. Remove front clamp (3).

(4) Remove eight screws (9) and washers (10), and remove clamp (2) and shroud (1).

b. Inspection and Repair.

(1) Inspect shroud for loss of resiliency, cracks, breaks, and cuts. Repair minor cracks, breaks, and cuts (c below). Replace shroud that shows loss of resiliency or that is damaged beyond repair.

(2) Inspect shroud covers for bends, dents,

cracks, or damaged threads. Straighten bends and dents. Weld cracks (para 2-366). Remove burrs from threads. If inserts are damaged, notify direct support maintenance personnel.

c. *Chemically Self-Vulcanizing Shroud Patch Repair.* Self-vulcanizing repair method eliminates vulcanizing accessories necessary for hot patch repairs, and decreases spoilage due to aging. Adhesion of patch at high temperatures seems desirable. Patches for chemical curing are precured except for a thin layer of uncured rubber on the facing of the patch. When the patch comes in contact with a surface having been coated with chemical cement, that uncured layer is vulcanized. Chemically self-vulcanizing tube patches are used for puncture injuries. Chemically curing patch repair procedures are fast and easy. The following instructions are recommended:

(1) Cut around injury with sharp shears. Leave no sharp edges or corners. (Small holes can be repaired without cutting around injury.)

(2) Buff thoroughly around injury, 1/2 inch

beyond patch. (Use of abrasive band, budding, spoon, wire brush, or equal is recommended.)

(3) Clean buffed area with a cleaning solvent or rubber buff. Work solvent in with a clean rag to clean surface, and dry.

(4) Apply a coat of chemical vulcanizing cement to buffed surface of shroud, and allow to dry.

(5) Select correct patch size for injury. Remove half of the backing, being careful not to touch adhesive surface.

(6) Apply exposed adhesive surface to treated part of shroud. Then remove rest of backing, and press whole patch down. Stitch from center of patch to outer edge. Make sure patch is down tight. Stitch outer edge firmly.

(7) For additional information, refer to TM 9-2610-200-20 for repair of pneumatic tires, which is applicable to repair of track shrouds.

d. Installation.

(1) Position shroud (1) and clamp (2) on hull, and secure with eight washers (10) and screws (9).

(2) Position front clamp (3) and front cover (15) on shroud, and secure with four washers (11) and screws (12).

(3) Position rear cover (4) on shroud, and secure with rear clamp (3), four washers (7), and screws (8).

(4) Position track connecting fixture 5120-073-9736 as shown in figure 2-117. Tighten fixture until four screw holes of rear cover (4, fig. 2-118) are alined with mating holes in hull.

(5) Secure rear cover to hull with four washers (5) and screws (6). Remove track connecting fixture.

2-185. Shock absorber (fig. 2-119)

a. Removal.

(1) Remove cotter pin (7), slotted nut (6), washer (5), and outer seal (4) securing upper end of shock absorber (3) to mounting bracket (1). Discard cotter pin and seal.

(2) Remove cotter pin (11), slotted nut (12), washer (5), and outer seal (4) from shock absorber pin (10). Discard cotter pin and seal.

(3) Screw remover (5120-01-102-4628) (13) onto shock mounting bracket (1). Make sure remover is snugged tight against shock absorber (8) while striking. Strike remover with a hammer until shock absorber comes loose.

(4) Remove remover from shock mounting bracket (1) and install on support arm pin (10) and tighten remover against shock absorber. Strike remover with a hammer until shock absorber comes loose.

(5) Remove remover (13) from support arm pin (10) and remove shock absorber (3).

(6) Remove and discard two inner seals (2).

(7) If pin (10) is damaged beyond repair, replace pin (para 2-186.1).

b. Inspection and Repair. Inspect shock absorber for fluid leaks and tight fit on mount. Replace shock absorber that shows a loose fitting bearing. Do not mistake a thin film of oil that may cover shock absorber for leaking fluid.

c. Installation.

(1) Install two new inner seals (2) on support arm pin (10) and mounting bracket (1).

(2) Position shock absorber (3) on mounting bracket (1) and on support arm pin (10).

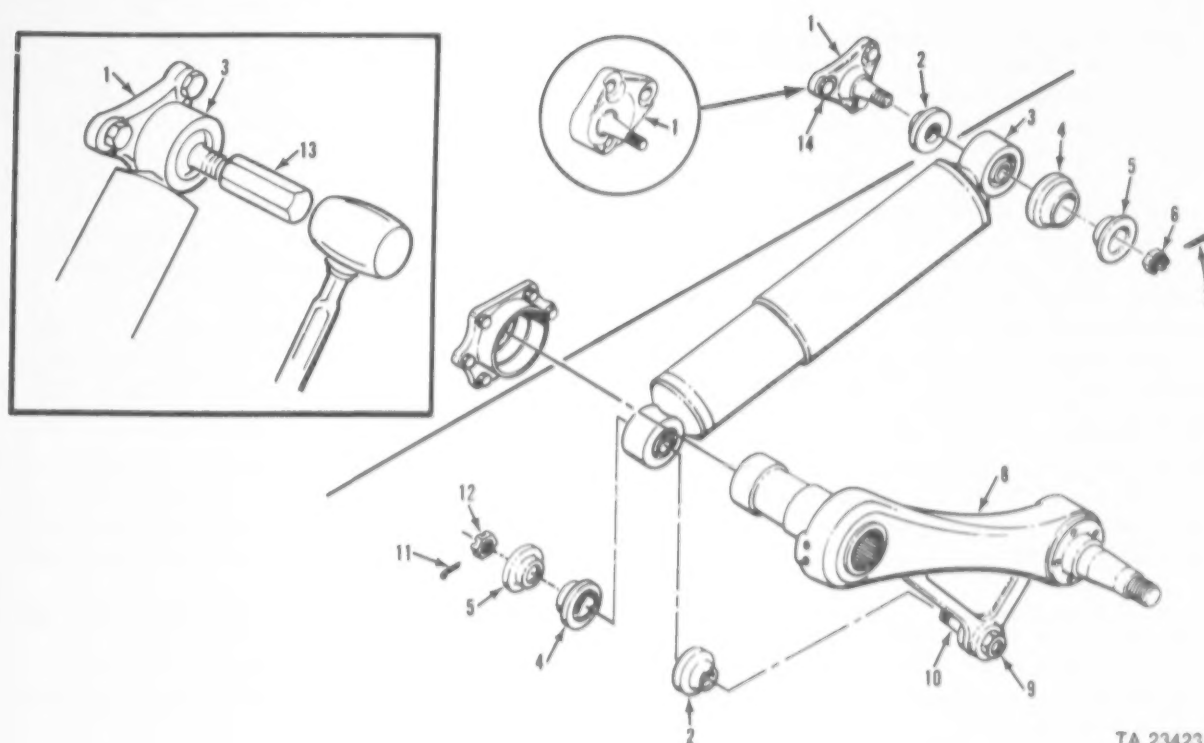
NOTE

Make certain that larger bearing openings in shock absorber are installed first.

(3) Install new outer seal (4) in absorber (3), and secure to road wheel support arm (8) with washer (5) and nut (12).

(4) Secure shock absorber (3) to mounting bracket (1) with outer seal (4), washer (5), and nut (6).

(5) Apply 60 to 80 pound-feet torque to nuts (6 and 12). If nuts and holes through mounts are alined, install two new cotter pins (7 and 11). If holes are not alined, tighten nuts until alinement is first achieved and install pins.



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- | | |
|--------------------|-------------------------------|
| 1 Mounting bracket | 8 Support arm |
| 2 Inner seal (2) | 9 Pin nut |
| 3 Shock absorber | 10 Pin |
| 4 Outer seal (2) | 11 Cotter pin |
| 5 Washer (2) | 12 Slotted nut |
| 6 Slotted nut | 13 Remover (5120-01-102-4628) |
| 7 Cotter pin | 14 Screw (3) |

Figure 2-119. Shock absorber and mounting bracket.

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Figure 2-120. Using shock absorber remover.

2-186. Shock Absorber Mounting Bracket (fig. 2-119)

a. Removal.

- (1) Remove shock absorber (para 2-185).
- (2) Remove three screws (14) and mounting bracket (1).

b. Inspection and Repair.

- (1) Inspect mounting bracket for cracks and deformation. Replace cracked or bent mounting bracket.

- (2) Inspect bracket inserts in hull. If loose or damaged, notify direct support personnel.

c. Installation.

NOTE

Do not interchange forward and rear mounting brackets on M730A1.

- (1) Position mounting bracket (1) on hull and secure with three screws (14). Tighten screws (14) to 130 to 140 pound-feet torque.

- (2) Install shock absorber (para 2-185).

2-186.1. Support Arm Pin (fig. 2-119)

a. Removal.

- (1) Remove road wheel support arm (para 2-199).
- (2) Remove nut (6) from pin (7).
- (3) Support arm on wood blocks, and drive pin (10) from support arm (8) using a heavy hammer. Discard pin.

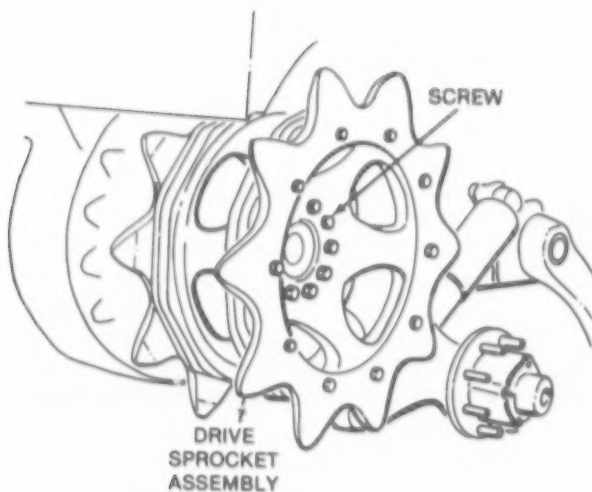
b. Inspection and Repair.

- (1) Inspect pin for burred or damaged threads. Replace pin that is cracked or has damaged threads.
- (2) Inspect nut for burred or damaged threads. Replace nut that has damaged threads.

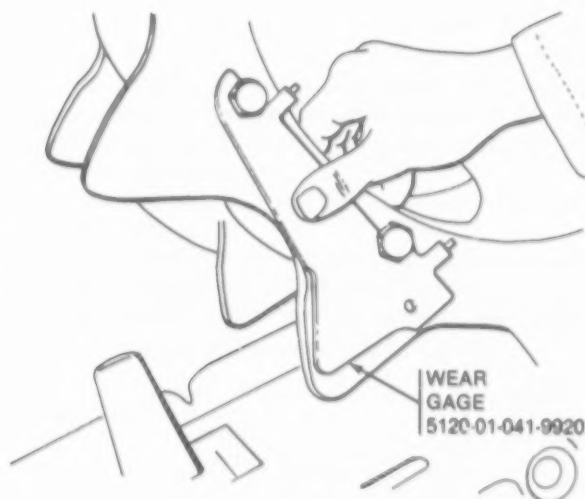
c. Installation.

- (1) Apply engine oil OE/HDO to tapered shaft of new pin (10). Install pin (10) in support arm (8) and secure with nut (6). Tighten nut to 120 to 140 pound-feet torque.

- (2) Install road wheel support arm (para 2-199).



A — Drive sprocket assembly



B — Using wear gage

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Figure 2-121. Train drive sprocket assembly.



2-187. Track Drive Sprocket (fig. 2-121)*a. Removal.*

- (1) Remove track shroud (para 2-184).
- (2) Relieve track tension (TM 9-1450-585-10).
- (3) Disconnect track at a point midway between front road wheels and drive sprocket assembly (TM 9-1450-585-10).
- (4) Lift track from drive sprocket assembly.
- (5) Remove 10 screws securing drive sprocket assembly to final drive, and remove drive sprocket assembly. Discard screws.

b. Inspection and Repair. Check drive sprocket assembly teeth for wear using gage — 5120-01-041-9920 (B, fig. 2-121). Replace drive sprocket wheels (para 2-188) or reverse sprocket wheel if wear is deeper than gage.

c. Installation.

- (1) Position drive sprocket assembly on final drive output shaft, and secure with 10 new screws. Tighten screws to 170 to 190 pound-feet torque.
- (2) Position track on drive sprocket assembly.
- (3) Connect track (TM 9-1450-585-10).
- (4) Adjust track tension (TM 9-1450-585-10).
- (5) Install track shroud (para 2-184).

2-188. Drive Sprocket Wheel and Cushion (fig. 2-122)*a. Removal.*

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).
- (3) Disconnect track at point midway between front road wheel and drive sprocket assembly (TM 9-1450-585-10).
- (4) Lift track from drive sprocket assembly.
- (5) Remove 10 cap screws securing outer drive sprocket wheel to sprocket carrier, and remove outer

drive sprocket wheel. Discard screws.

NOTE

Rotation of cushion with respect to sprocket may be 1.50 inches (3.8 cm) maximum from nominal position after vehicle break-in. Measurements to be taken from cushion outer perimeter. Cushions which rotate beyond 1.50 inches (3.8 cm) of initial position must be replaced, not repositioned.

(6) Remove outer rubber cushion from sprocket carrier.

(7) If inner drive sprocket wheel is being removed, remove drive sprocket assembly from final drive (para 2-187), and remove inner drive sprocket wheel and cushion ((5) and (6) above).

b. Inspection and Repair.

(1) Check teeth of drive sprocket wheel for wear using gage 5120-01-041-9920 as shown in B, figure 2-121. Check tooth wear before you remove the drive sprocket wheel. Replace wheel or reverse drive sprocket assembly (para 2-187) if wear is deeper than gage.

(2) Inspect cushion for gouges, chips, and cuts. Replace cushion if defects cause thumping.

c. Installation.

(1) Position rubber cushion on sprocket carrier with apex points midway between mounting holes in sprocket carrier rim. Press on until cushion is seated firmly against rear lip of sprocket carrier.

(2) Position drive sprocket wheel, with flat side away from carrier, on sprocket carrier, and secure with 10 new cap screws. Tighten cap screws to 110 to 115 pound-feet torque.

(3) Install drive sprocket assembly on final drive (para 2-187).

- (4) Position track on drive sprocket assembly.
- (5) Connect track (TM 9-1450-585-10).
- (6) Adjust track tension (TM 9-1450-585-10).
- (7) Install track shroud (para 2-184).

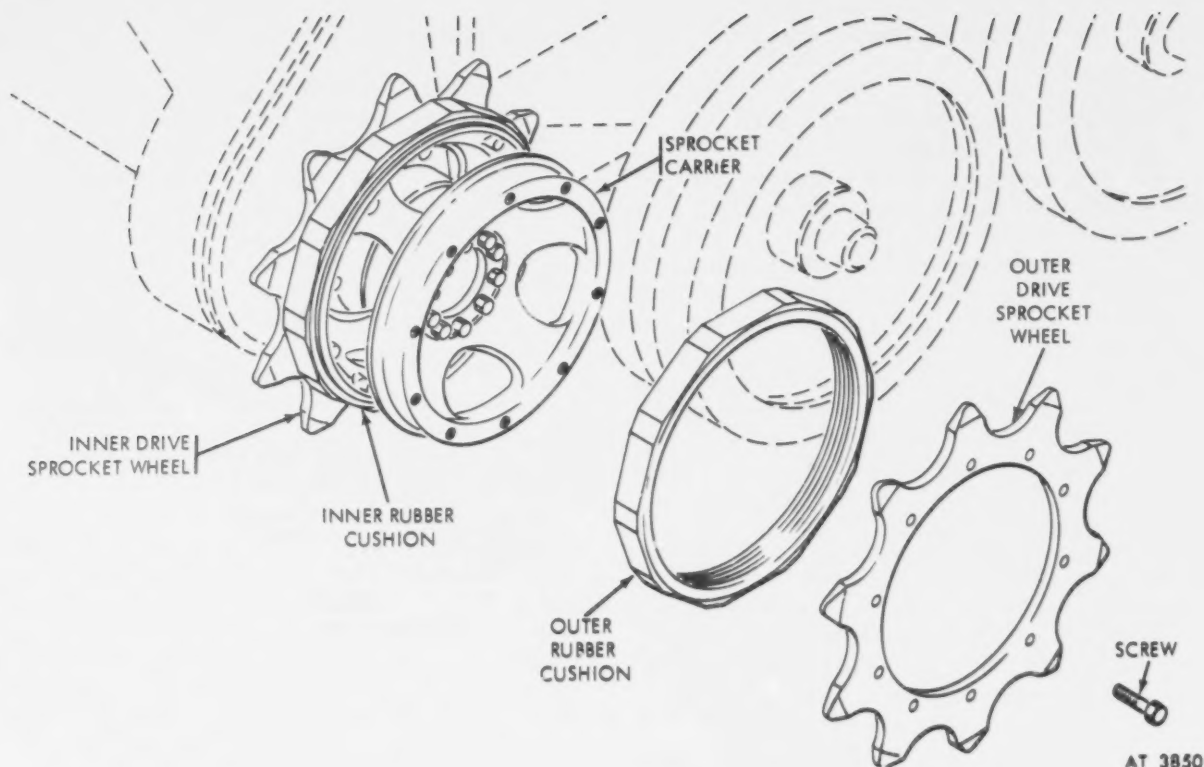


Figure 2-122. Drive sprocket wheel and cushion.

2-189. Track Tension Adjuster

(fig. 2-123)

a. Removal.

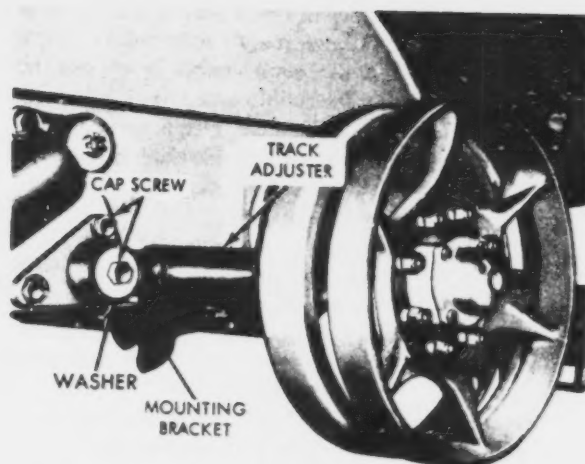
- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).
- (3) Disconnect track at a point midway between front road wheel and drive sprocket assembly (TM 9-1450-585-10).
- (4) Lift track from track idler wheels.
- (5) Remove track idler wheel (para 2-191).
- (6) Remove track idler wheel arm assembly (para 2-194).
- (7) Remove cap screw and flat washer securing track adjuster to bracket.
- (8) Remove cap screw and flat washer securing track adjuster to track idler wheel arm assembly, and remove track adjuster.

b. Inspection and Repair. Inspect track adjuster

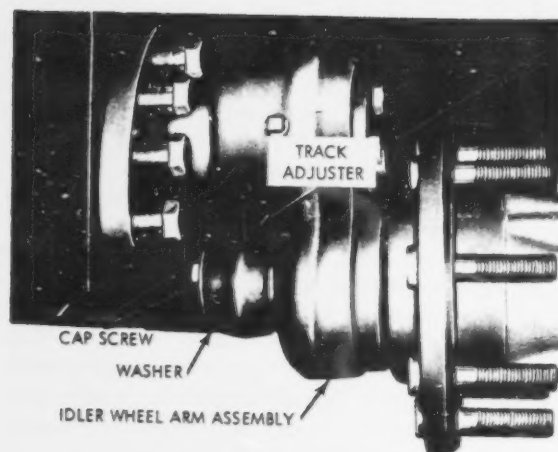
for excessive leaking of grease. Replace leaky adjuster.

c. Installation.

- (1) Position track adjuster on bracket and track idler wheel arm assembly, and secure to track idler wheel arm assembly with screw and washer.
- (2) Secure track adjuster to bracket with screw and washer. Tighten screw at both ends of track adjuster to 130 to 140 pound-feet torque.
- (3) Install track idler wheel arm assembly (para 2-194).
- (4) Install track idler wheels (para 2-191).
- (5) Position track on track idler wheels.
- (6) Connect track (TM 9-1450-585-10).
- (7) Adjust track tension (TM 9-1450-585-10).
- (8) Install track shroud (para 2-184).



A—TRACK ADJUSTER AT BRACKET END



B—TRACK ADJUSTER AT IDLER WHEEL END

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Figure 2-123. Track tension adjuster.

2-190. Track Tension Adjuster Mounting Bracket (fig. 2-123)

a. Removal.

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).
- (3) Disconnect track (TM 9-1450-585-10).
- (4) Remove track idler wheels (para 2-191).
- (5) Remove track adjuster (para 2-189).
- (6) Remove three cap screws securing bracket to hull.

(7) Remove bracket from hull.

b. Inspection and Repair. Inspect bracket for worn, grooved, or galled adjuster mounting surface. Replace bracket that shows any of these defects.

c. Installation.

- (1) Position bracket on hull, and secure with three cap screws. Tighten screws to 130 to 140 pound-feet torque.
- (2) Install track adjuster (para 2-189).
- (3) Install track idler wheels (para 2-191).
- (4) Connect track (TM 9-1450-585-10).
- (5) Adjust track tension (TM 9-1450-585-10).
- (6) Install track shroud (para 2-184).

2-191. Track Idler Wheels (fig. 2-124)

a. Removal.

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).
- (3) Disconnect track at a point midway between front road wheel and drive sprocket assembly (TM 9-1450-585-10).
- (4) Lift track from track idler wheels.

(5) Remove eight self-locking nuts securing to track idler wheels to hub, and remove idler wheels.

b. Inspection and Repair. Inspect for foreign matter, excessive wear, grooves, scratches, and broken condition. Remove foreign matter, grooves, and scratches. If grooves or scratches are deep, or wheel is broken, replace idler wheel.

c. Installation.

- (1) Position two track idler wheels on hub so that outside idler wheel spokes do not align with inside idler wheel spokes, and secure with eight nuts. Tighten nuts to 150 to 170 pound-feet torque.
- (2) Position track on track idler wheels.
- (3) Connect track (TM 9-1450-585-10).
- (4) Adjust track tension (TM 9-1450-585-10).
- (5) Install track shroud (para 2-184).

2-191.1 Track Idler Wheels (M730A1)

(fig. 2-123.1)

a. Removal.

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).
- (3) Disconnect track at a point midway between front road wheel and drive sprocket assembly (TM 9-1450-585-10).

(4) Lift track from track idler wheels.

(5) Remove eight self-locking nuts securing outboard idler wheel and inboard idler wheel to idler wheel hub. Remove two idler wheels. Discard nuts.

b. Inspection and Repair. Inspect for foreign matter, excessive wear, grooves, scratches, and broken condition. Remove foreign matter, grooves, and scratches. If grooves or scratches are deep, or wheel is broken, replace idler wheel.

c. Installation.**NOTE**

Inboard and outboard idler wheels are different. Do not mix them up. Inboard wheel (marked 11669373) is 3.25 inches wide; outboard wheel (marked 10907799) is 3.12 inches wide.

(1) Measure and identify the inboard and outboard idler wheels.

(2) Install inboard and outboard idler wheels on idler wheel hub so that spokes of wheels do not align. Secure idler wheels with eight new self-locking nuts.

(3) Tighten eight nuts to 150 to 170 pound-feet torque.

(4) Position track on track idler wheels.

(5) Connect track (TM 9-1450-585-10).

(6) Adjust track tension (TM 9-1450-585-10).

(7) Install track shroud (para 2-184).

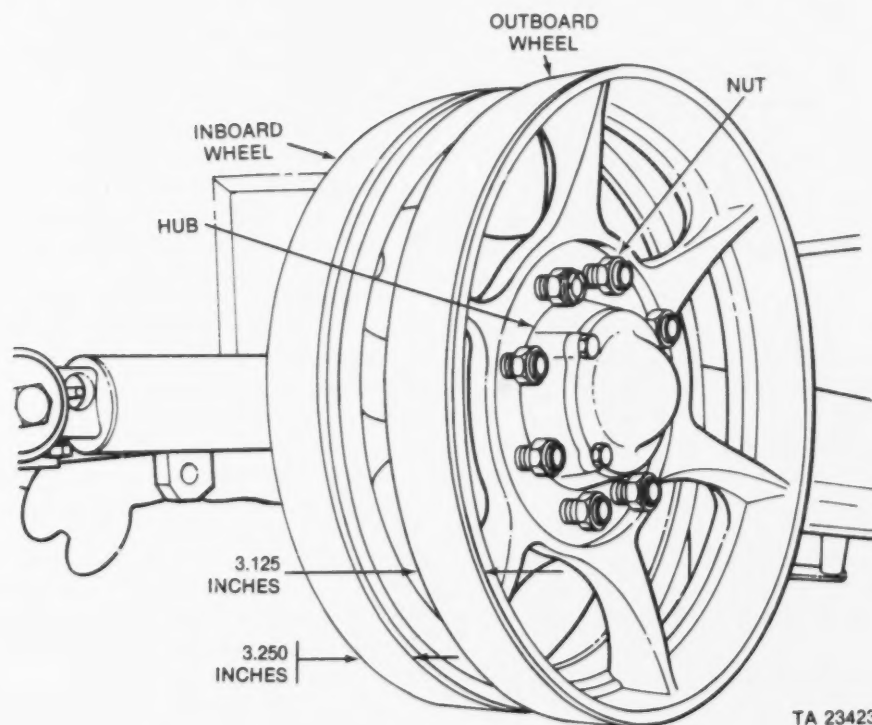
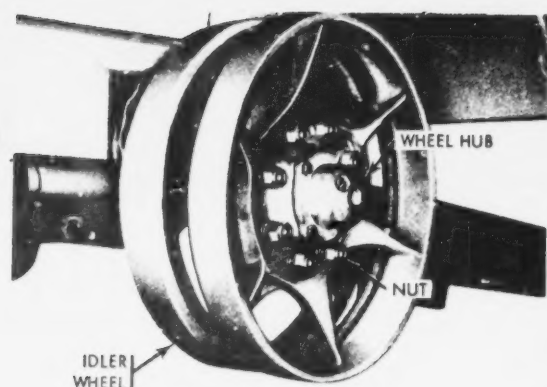


Figure 2-123.1. Track Idler Wheels (M730A1).



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Figure 2-124. Track idler wheel.

2-192. Track Idler Lubrication Conversion**a. Track Idler Arm (fig. 2-125).**

- (1) Remove two pipe plugs from two oil fill openings at top of arm assembly.
- (2) Install reducer and lubrication fitting (table 2-24) in forward oil fill opening.
- (3) Install reducer and relief valve (table 2-24) in rear oil fill opening.
- (4) Disassemble housing (para 2-193) and hand-pack with GAA, then reassemble housing.
- (5) Fill housing with GAA through lubrication fitting until lubricant escapes through the relief valve.

b. Idler Wheel Hub Conversion.

- (1) Disassemble idler wheel hub or road wheel hub (para 2-193).

- (2) Remove machine screw from one oil fill opening in cover plate (hub cap).

- (3) Drill and tap $\frac{1}{8}$ inch pipe thread through existing oil fill opening in cover plate for lubrication fitting (table 2-24), and install lubrication fitting.

- (4) Locate, drill, countersink, and tap one hole in hub housing for relief valve (fig. 2-126).

- (5) Thoroughly clean all chips and shavings from hub, clean with dry cleaning solvent or mineral spirits paint thinner, and dry with compressed air.

- (6) Install relief valve (table 2-24) in hub. Hand-pack hub with GAA.

- (7) Assemble road wheel hub or idler wheel hub (para 2-193).

- (8) Fill hub assembly with GAA through lubrication fitting in cover plate until lubricant escapes through the relief valve in hub housing.

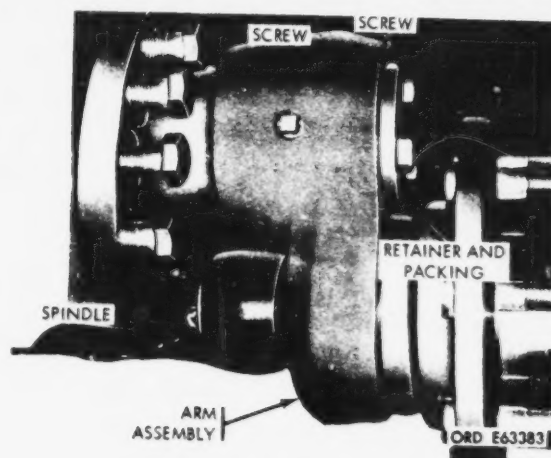


Figure 2-125. Track idler wheel arm assembly.

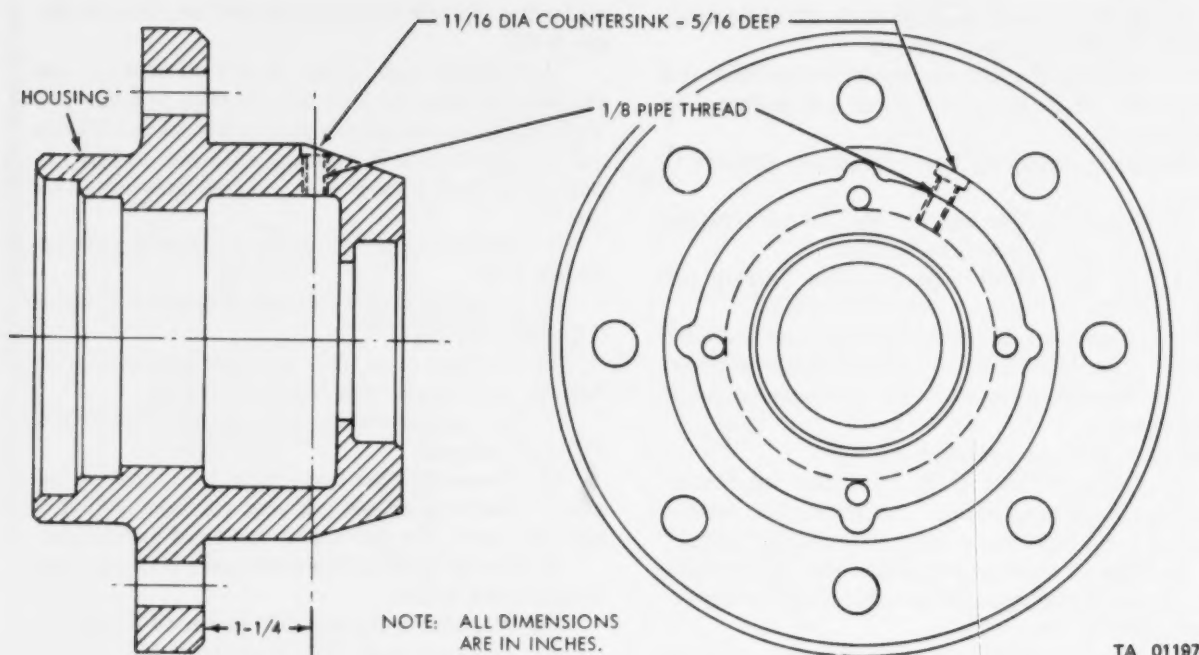


Figure 2-126. Road or idler wheel hub conversion to GAA lubrication.

2-193. Idler and Road Wheel Hub, Bearing, and Seal (fig. 2-127)

a. Removal.

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).

- (3) Disconnect track (TM 9-1450-585-10).
- (4) Lift track away from idler wheels or road wheels.
- (5) Remove track idler wheels (para 2-191) or road wheels (para 2-196).

Table 2-24. Parts Used for Conversion to GAA Lubrication

Nomenclature	NSN number	Quantity per assembly	Use
TRACK IDLER ASSEMBLY			
Lubrication fitting	4730-00-172-0028	2	One used with reducer in forward oil fill opening in idler arm to lubricate idler arm; one used in cover plate to lubricate hub.
Reducer	4730-00-186-3024	2	Used with lubrication fitting and relief valve in place of pipe plugs in housing oil fill openings.
Relief valve	4730-00-542-5683	2	One used with reducer in two rear oil fill openings in idler arm; one used in hub.
ROAD WHEEL SUPPORT ARM ASSEMBLY			
Lubrication fitting	4730-00-172-0028	2	One used with reducer in forward oil fill opening in support arm to lubricate support arm; one used in cover plate to lubricate hub.
Reducer	4730-00-186-3024	2	Used with lubrication fitting and relief valve in place of two pipe plugs in arm oil fill openings.
Relief valve	4730-00-542-5783	2	One used with reducer in rear oil fill opening in support arm; one used in hub.

(6) Drain oil from idler or road wheel bearings (LO 9-1450-585-12) (early model).

(7) Remove four cap screws (13) from cover (12) and gasket (11), and remove cover and gasket. Discard gasket.

(8) Remove plug (17) and O-ring (16). Discard O-ring.

(9) Remove cotter pin (18), slotted nut (15), and key washer (19). Discard cotter pin.

(10) Remove outer tapered roller bearing (14) from hub (9), and remove hub from arm (3).

(11) Remove bearing encased seal (24) and inner tapered roller bearing (23) from hub (9). Discard seal.

(12) Remove inner cup (22) and outer cup (20) from hub (9).

b. Inspection and Repair.

(1) Inspect mounting surfaces for nicks, scratches, burs, and foreign matter. Repair defects. Replace parts that show deep scratches or nicks.

(2) Inspect bearing for rough and uneven rotation. Replace bearings that are still rough or uneven after cleaning and oiling.

(3) Inspect bearings for scored, pitted, scratched, cracked, or chipped cups, and for excessive wear of rollers. Replace bearings that show any of these defects.

(4) Inspect housing bore and shaft of defective bearing for grooves, burs, and galls that indicate bearing has been turning in housing or on shaft. If damage cannot be repaired, replace parts.

(5) Inspect threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

c. Installation.

CAUTION

Do not use air powered grease guns to install grease in idler assembly.

NOTE

If hub (9) has grease fitting, pack bearings, hub, and bearing cover with GAA grease during assembly.

(1) Install inner cup (22) and outer cup (20) in hub (9) using replacer 5120-00-678-2796 or 5120-01-102-4627 (M730A1) as shown in figure 2-128.

CAUTION

Seals for grease filled end oil filled hubs are different. For grease filled hubs, use seal 5330-01-035-9832. For oil filled hubs, use seal 5330-00-679-9879.

(2) Position inner bearing (23, fig. 2-127) in cup (22), apply a light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to new seal (24), and install

seal using replacer 5120-00-678-2797 as shown in figure 2-128.

(3) Position hub (9, fig. 2-127) on arm (3), and install outer bearing (14), washer (19), and nut (15). Tighten nut to 140 to 150 pound-feet torque; loosen nut until no torque is applied; retighten to 70 to 75 pound-feet torque; back off 15 to 30 degrees to cotter pin hole.

(4) Secure washer (19) and nut (15) with new cotter pin (18).

(5) Install plug (17) and new O-ring (16) in cover (12) (early model).

(6) Position cover (12) and new gasket (11) on hub (9), and secure with four screws (13).

(7) Fill bearing cavity with oil (LO 9-1450-585-12) (early model).

(8) If assembly has been packed with grease, use a hand operated grease gun and complete filling of hub and cover. Do not use air powered grease gun.

(9) Install track idler wheels (para 2-191) or road wheels (para 2-196).

(10) Position track on idler and road wheels.

(11) Connect track (TM 9-1450-585-10).

(12) Adjust track tension (TM 9-1450-585-10).

(13) Install track shroud (para 2-184).

Legend to fig. 2-127.

- 1 Spindle
- 2 O-ring
- 3 Arm assembly
- 4 Plug (2)
- 5 Grease fitting
- 6 O-ring
- 7 Retainer
- 8 Screw (3)
- 9 Hub
- 10 Plug (2)
- 11 Gasket
- 12 Cover
- 13 Cover cap screw
- 14 Outer tapered roller bearing
- 15 Slotted nut
- 16 Cover plug O-ring
- 17 Cover plug
- 18 Cotter pin
- 19 Key washer
- 20 Outer cup
- 21 Ribbed shouldered bolt
- 22 Inner cup
- 23 Inner tapered roller bearing
- 24 Encased seal
- 25 Grease fitting
- 26 Relief valve
- 27 Relief valve
- 28 Screw (8)

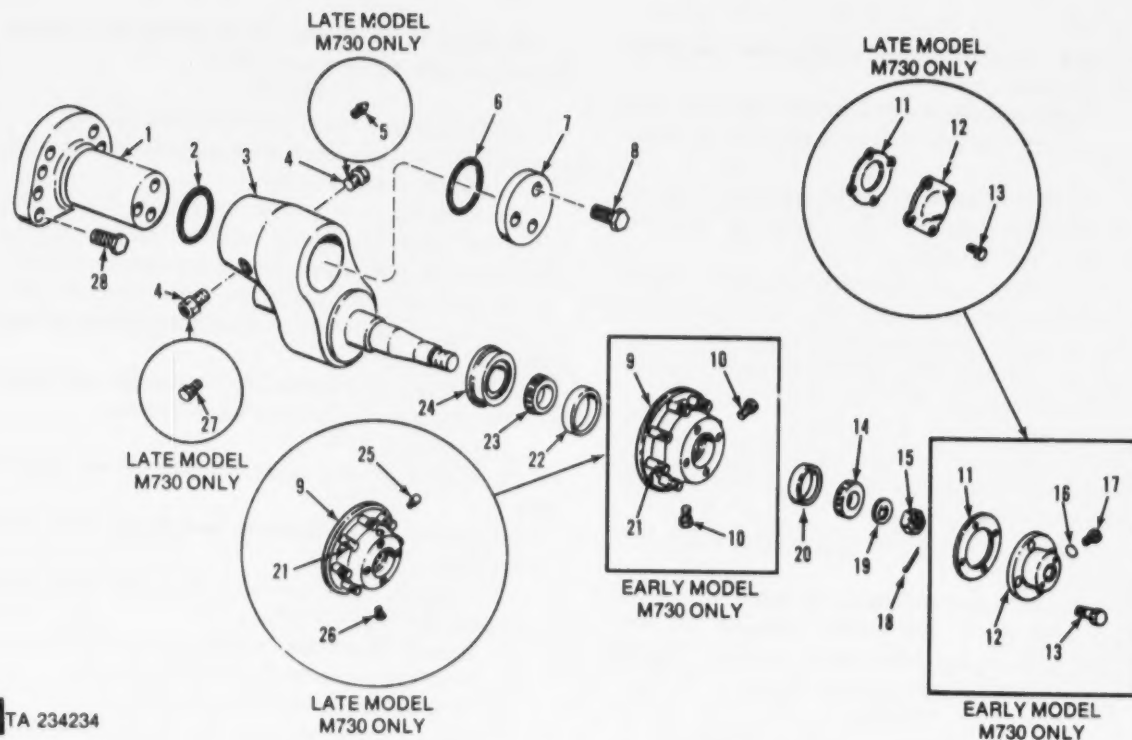
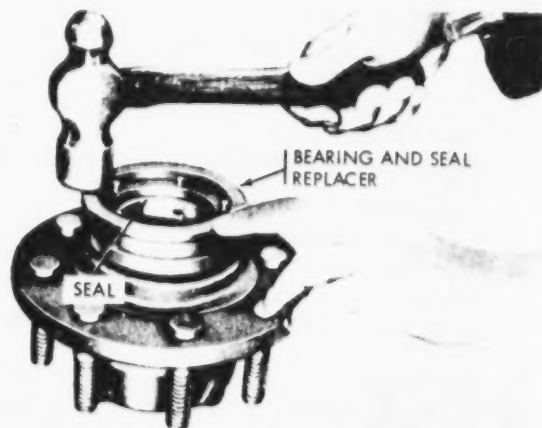
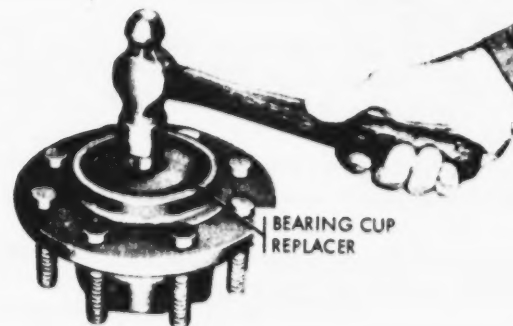


Figure 2-127. Track idler assembly—exploded view.



A—INNER BEARING AND SEAL



B—BEARING CUP

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Figure 2-128. Replacing bearing, seal, and cup using replacer 5120-00-678-2796, replacer 5120-00-678-2797, and replacer 5120-01-102-4627.

2-194. Track Idler Wheel Arm Assembly (M730) (fig. 2-125)

a. Removal.

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).

- (3) Disconnect track (TM 9-1450-585-10).
- (4) Remove track idler wheels (para 2-191).
- (5) Disconnect track adjuster at track idler wheel arm assembly (para 2-189).
- (6) Remove three cap screws from retainer,

and remove retainer and preformed packing. Discard packing.

(7) Remove arm assembly from spindle, and remove preformed packing from assembly. Discard packing.

(8) If track idler arm is to be replaced, remove idler wheel hub, tapered roller bearings, and encased seal (para 2-193).

b. Inspection and Repair. Inspect sleeve bearings for bore wear, grooves, and scratches. Remove grooves and scratches. Replace arm assembly if bearings show deep grooves, scratches, or excessive wear.

c. Installation.

(1) If replacement arm is installed, install idler wheel hub, bearings, and seal removed from replaced arm (para 2-193).

(2) Install new preformed packing inside arm assembly.

(3) Position arm assembly on spindle, position retainer with new preformed packing on arm assembly, and secure with three screws. Tighten screws to 75 to 80 pound-feet torque.

NOTE

Position track adjuster on arm assembly at same time arm assembly is positioned on spindle.

(4) Connect track adjuster at arm assembly (para 2-189).

(5) Install track idler wheels (para 2-191).

(6) Connect track (TM 9-1450-585-10).

(7) Adjust track tension (TM 9-1450-585-10).

(8) Lubricate arm assembly bearing (LO 9-1450-585-12).

(9) Install track shroud (para 2-184).

2-194.1 Track Idler Wheel Arm Assembly (M730A1) (fig. 2-128.1)

a. Removal.

(1) Remove track shroud (para 2-184).

(2) Relieve tension on track (TM 9-1450-585-10).

(3) Disconnect track (TM 9-1450-585-10).

(4) Remove track idler wheels (para 2-191).

(5) Disconnect track adjuster at track idler wheel arm assembly (para 2-189).

NOTE

If arm is to be separated from spindle, notify direct support personnel.

(6) Remove 10 screws (18) securing idler assembly to hull and remove assembly.

NOTE

Only nine screws are used on some models.

(7) Remove hub (15) from assembly (para 2-193).

b. Inspection and Repair.

(1) Inspect mounting surfaces for nicks, scratches, burs, and foreign matter. Repair defects. Replace parts that show deep scratches or nicks.

(2) Inspect threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

(3) Inspect idler assembly for cracks and deformations. Replace parts that have defects.

c. Installation.

(1) If hub (15) was removed, install hub (para 2-193).

(2) Install idler assembly and secure with nine screws (18).

(3) Connect track adjuster at track idler wheel arm assembly (para 2-189).

(4) Install track idler wheels (para 2-191).

(5) Position track on track idler wheels.

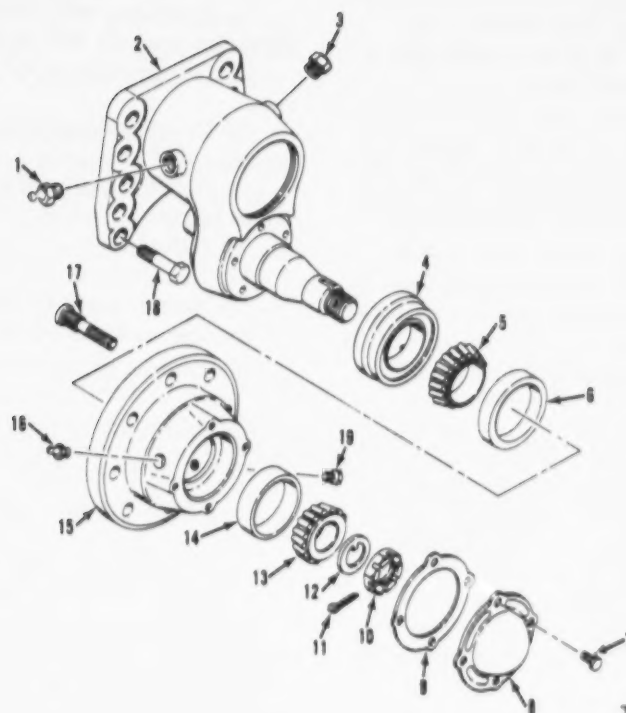
(6) Connect track (TM 9-1450-585-10).

(7) Adjust track tension (TM 9-1450-585-10).

(8) Install track shroud (para 2-184).

Legend to fig. 2-128.1.

- 1 Grease fitting
- 2 Spindle and arm assembly
- 3 Relief valve
- 4 Encased seal
- 5 Inner tapered roller bearing
- 6 Inner cup
- 7 Screw (4)
- 8 Cover
- 9 Gasket
- 10 Slotted nut
- 11 Cotter pin
- 12 Key washer
- 13 Outer tapered roller bearing
- 14 Outer cup
- 15 Hub
- 16 Grease fitting
- 17 Ribbed shouldered bolt
- 18 Screw (9)
- 19 Relief valve



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Figure 2-128.1. Track idler wheel arm assembly (M730A1).

2-195. Track Idler Arm Mounting Spindle (fig. 2-125)

a. Removal.

- (1) Remove track shroud (para 2-184).
 - (2) Relieve tension on track (TM 9-1450-585-10).
 - (3) Disconnect track at a point midway between front road wheel and drive sprocket (TM 9-1450-585-10).
 - (4) Lift track from track idler wheels.
 - (5) Remove track idler wheels (para 2-191).
 - (6) Disconnect track adjuster at track idler wheel arm assembly (para 2-189).
 - (7) Remove idler assembly (para 2-194).
 - (8) Remove eight cap screws securing idler arm mounting spindle to hull, and remove spindle.
- b. *Inspection and Repair.* Inspect spindle for excessive wear, grooves, and scratches. Remove grooves and scratches. Replace spindle that shows deep grooves, scratches, or excessive wear.

c. Installation.

- (1) Position idler arm mounting spindle on hull, and secure with eight screws. Tighten screws to 315 to 325 pound-feet torque.
- (2) Install idler assembly (para 2-194).
- (3) Connect track adjuster at track idler wheel arm assembly (para 2-189).
- (4) Install track idler wheels (para 2-191).
- (5) Position track on track idler wheels.
- (6) Connect track (TM 9-1450-585-10).
- (7) Adjust track tension (TM 9-1450-585-10).
- (8) Install track shroud (para 2-184).

2-196. Road Wheels (fig. 2-129)

a. Removal.

- (1) Park carrier on firm level ground.
- (2) Remove track shroud (para 2-184).
- (3) Relieve tension on track (TM 9-1450-585-10).
- (4) Deleted

(5) Position lifter 5120-01-062-5607 as shown in B against arm with lower tips of lifter in track link just to the rear of wheels to be removed.

(6) Loosen but do not remove eight self-locking nuts securing road wheels to hub.

(7) Drive carrier slowly in reverse until lifter is vertical and road wheels clear track.

(8) Block front and rear of carrier.

(9) Remove eight self-locking nuts, previously loosened, and flat washers securing road wheels to hub, and road wheels in pairs. Discard self-locking nuts.

b. Inspection and Repair.

(1) Inspect wheel bolt holes for elongation or excessive wear due to loose mounting. Replace wheel that shows this defect.

(2) Inspect tires for gouges, chips, cuts, and sep-

aration from disk. Replace entire wheel that shows tire separation or tire damage sufficient to cause thumping.

c. Installation.

(1) Position road wheels on studs, and install eight flat washers and new self-locking nuts.

(2) Remove blocking from front and rear of carrier.

(3) Drive carrier slowly forward until wheels are on track and lifter is free, and remove lifter.

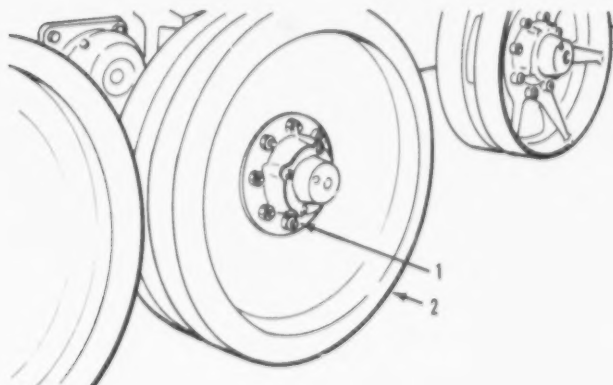
(4) Tighten eight self-locking nuts securing road wheel to hub to 150 to 170 pound-feet torque.

(5) Deleted

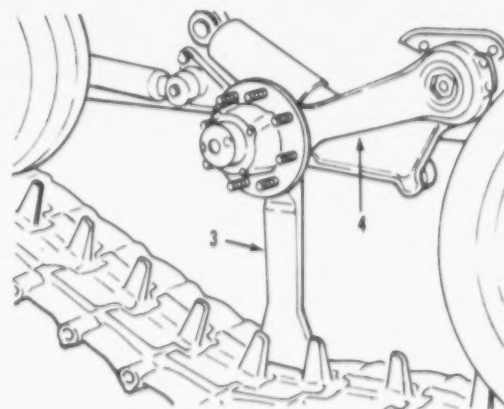
(6) Deleted

(7) Adjust track tension (TM 9-1450-585-10).

(8) Install track shroud (para 2-184).



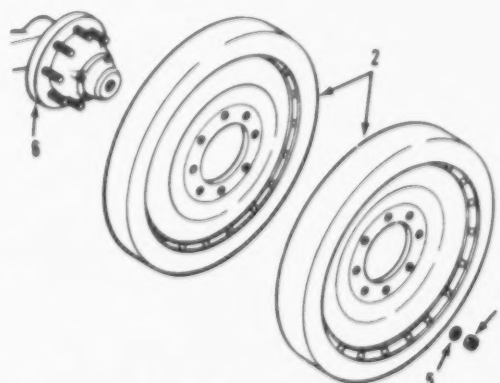
A — Road wheel nuts



B — Using road wheel lifter

WARNING
YOU CAN BE HURT IF
ROAD WHEEL LIFTER
SLIPS WHILE ROAD ARM
IS BEING RAISED OR
LOWERED. STAND CLEAR.

- 1 Nut (8)
- 2 Road wheel (2)
- 3 Lifter (5120-01-062-5607)
- 4 Support arm
- 5 Washer (8)
- 6 Hub



C — Road wheels

TA 234236

Figure 2-129. Road wheels.

2-197. Torsion Bar and Anchor (fig. 2-130)**a. Removal.**

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).
- (3) Disconnect track at a point midway between front road wheel and drive sprocket (TM 9-1450-585-10).
- (4) Remove road wheels (para 2-196).
- (5) If torsion bar is being removed from a front or rear road wheel arm, remove shock absorber (para 2-185).
- (6) Drive carrier slowly in forward until road wheel lifter is free, and remove lifter.
- (7) Remove screw securing male plug to road wheel arm.
- (8) Remove male plug using plug wrench 5120-00-053-3625 as shown in B, figure 2-131.
- (9) Pull torsion bar out of anchor using puller 5120-557-3615 with adapter 5120-322-5953 as shown in A, figure 2-131.
- (10) Remove puller and adapter, and remove torsion bar.
- (11) Repeat steps (1) through (10) above to remove opposite torsion bar.
- (12) Remove two screws, and remove anchor.

b. Inspection and Repair. Inspect torsion bar for worn, stripped, twisted, chipped, or burred splines. Remove burs. Replace bars that show any of the other defects.

c. Installation.**NOTE**

Left and right torsion bars are not interchangeable. To determine correct bar, position directional arrow on top; arrow must point towards front of carrier.

- (1) If torsion bar anchor has been removed, position anchor on hull, and install two screws. Tighten screws to 315 to 325 pound-feet torque.

CAUTION

Prior to inserting torsion bar in anchor, the index or missing tooth on either end of

torsion bar must be aligned with the anchor and road wheel arm simultaneously. This may be achieved by aligning the anchor end of the torsion bar to the anchor and moving the road wheel arm up or down until correct index alignment is obtained between torsion bar and road wheel arm.

- (2) Insert torsion bar through road wheel arm into torsion bar anchor.

CAUTION

Handle torsion bar with care; do not tear or cut rubberized wrapping.

- (3) Apply grease (GAA) to plug, and install plug. Secure with plug wrench 5120-053-3625 as shown in B, figure 2-131.

- (4) Install screw to secure torsion bar to plug. Tighten screw to 60 to 70 pound-feet torque.

NOTE

Before attempting to position road wheel lifter 5120-01-062-5607 it will be necessary to jack carrier high enough to raise road wheel arm.

- (5) Position road wheel lifter (para 2-196).
- (6) If torsion bar has been installed in a front or rear road wheel arm, install shock absorber (para 2-185).

- (7) Install road wheel (para 2-196).
- (8) Deleted
- (9) Repeat steps (1) through (8) above to install opposite torsion bar.
- (10) Adjust track tension (TM 9-1450-585-10).

- (11) Install track shroud (para 2-184).

2-198. Removal of Broken Torsion Bar (fig. 2-130)

- a. Remove road wheel end of torsion bar in same manner as unbroken bar (para 2-197).

- b. If broken torsion bar cannot be pulled out of anchor, remove anchor (para 2-197).

- c. Drive end of broken torsion bar out of anchor.

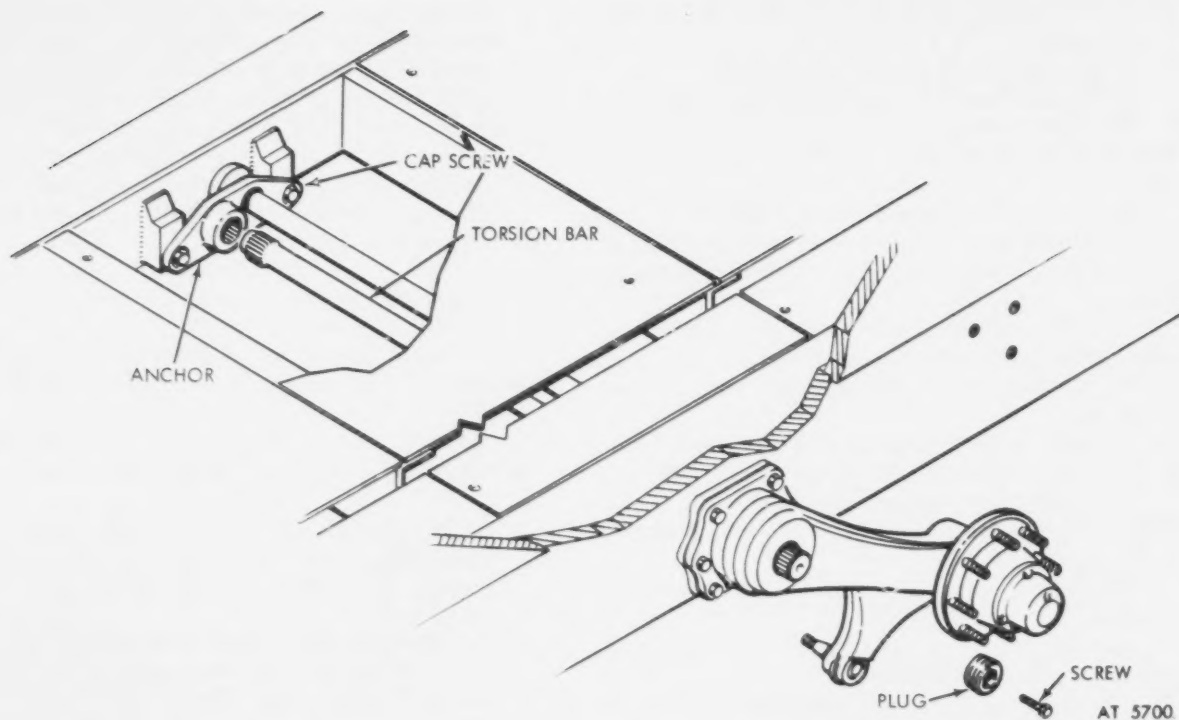
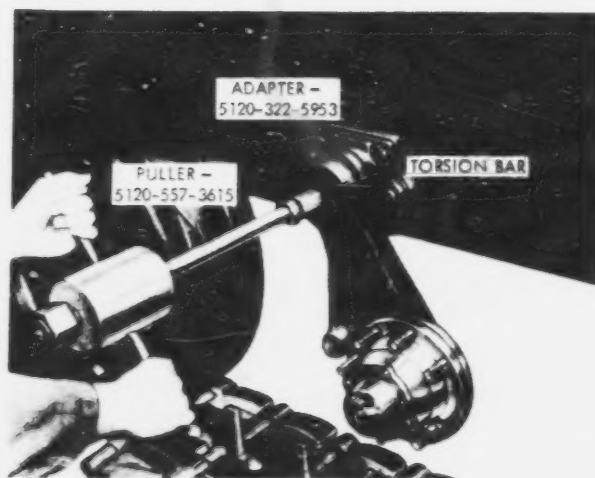


Figure 2-130. Torsion bar and anchor.



A-TORSION BAR SPECIAL TOOLS



B-TRUNNION NUT SPECIAL TOOL

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Figure 2-131. Using torsion bar and male plug removal special tools.

2-199. Road Wheel Support Assembly

a. Removal (fig. 2-132, M730).

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).
- (3) Deleted
- (4) Remove road wheels (para 2-196).
- (5) Remove torsion bar (para 2-197).
- (6) If front or rear road wheel support housing is being removed, remove shock absorber (para 2-185).
- (7) Remove six cap screws (21) securing support arm assembly to hull, and remove arm assembly. Remove and discard O-ring (23).

b. Removal (fig. 2-132.1, M730A1)

- (1) Remove track shroud (para 2-184).
- (2) Relieve tension on track (TM 9-1450-585-10).
- (3) Remove road wheels (para 2-196).
- (4) Remove torsion bar (para 2-197).
- (5) If third or fourth road wheel is being removed, remove two bolts (17) that secure guard (18) to support arm housing (19). Remove guard.
- (6) On first, second, or last road wheel, remove shock absorber (para 2-185). Remove four bolts (20) and two bolts (17) that secure support arm assembly to hull. Remove assembly.
- (7) On third or fourth road wheel, remove four bolts (20) that secure support arm assembly to hull. Remove assembly.
- (8) Remove O-ring (21) from support arm housing (19). Discard O-ring.

c. Disassembly (fig. 2-132, M730).

- (1) Place container under road wheel hub (1) and road wheel support arm (2). Remove two screws (3), O-rings (4), and plugs (5) from hub (1). Remove two plugs (6) from support arm (2). Drain oil. Discard O-rings (oil filled housing only).
- (2) Remove four screws (7) that secure hubcap (8) and gasket (9) to hub (1). Discard gasket.
- (3) Remove cotter pin (10), nut (11), and key washer (12) that secure hub (1) to support arm (2). Discard cotter pin.
- (4) If hub shoulder bolt(s) (13) is damaged, remove bolt with heavy hammer. Discard bolt(s).
- (5) Remove bearing (14), seal (15), and bearing (16) from hub (1). Discard seal.
- (6) Remove two bearing cups (17 and 18) from hub (1).
- (7) Remove grease fitting (19) and relief valve (20) from hub (1) (grease filled housing only).
- (8) Remove six screws (24) and three tablock washers (25) that secure seal (26), retainer plate (27), and gasket (28) to support arm (2). Discard washers, seal, and gasket.

- (9) Remove bearing (29) from rear of support arm housing (22).

- (10) Remove seal (30), spacer (31), and bearing (32) from front of support arm housing (22).

- (11) Remove grease fitting (33) and relief valve (34) from support arm (2) (grease filled housing only).

d. Disassembly (fig. 2-132.1, M730A1).

- (1) Remove four screws (1) that secure hubcap (2) and gasket (3) to road wheel hub (4). Remove hubcap. Discard gasket.

- (2) Remove cotter pin (5), nut (6), and key washer (7) that secure road wheel hub (4) to road wheel arm (8). Remove hub. Discard cotter pin.

- (3) Remove seal (9), two bearings (10 and 11), and two bearing cups (12 and 13) from wheel hub (4). Discard seal.

- (4) Remove grease fitting (14) and relief valve (15) from wheel hub (4).

- (5) If shoulder bolt (16) is damaged, remove bolt with a heavy hammer. Discard bolt(s).

- (6) Remove six screws (22) and three tablock washers (23) that secure seal (24), retainer plate (25), gasket (26), to road wheel support arm (8). Discard washers.

- (7) Remove seal (24), retainer plate (25), gasket (26), and support arm (8) from support arm housing (19). Discard seal and gasket.

- (8) Remove grease fitting (31) and relief valve (32) from support arm (8).

- (9) Remove bearing (27) from rear of support arm housing (19).

- (10) Remove spacer (28), seal (29), and bearing (30) from front of support arm housing (19). Discard seal.

- (11) If pin (34) is damaged beyond repair, remove nut (33) securing pin (34) to support arm (8) and drive pin(34) from support arm (8).

e. Inspection and Repair.

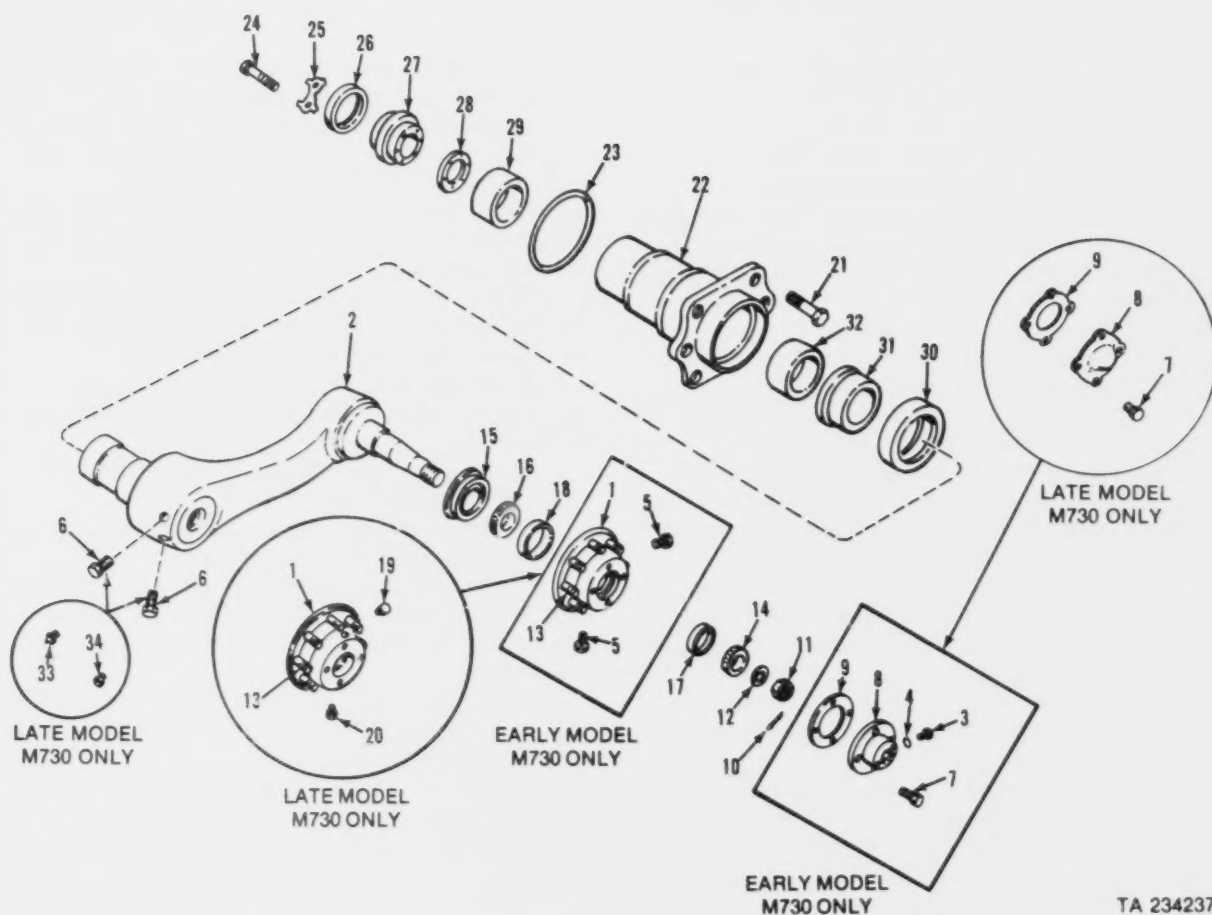
- (1) Inspect bearings for scored, pitted, scratched, cracked, chipped, and excessive wear of bearing surfaces. Replace bearings that show any of these defects.

- (2) Inspect housing bore and shaft of defective bearings for grooves, burs, or galls that indicate bearings have been turning in housing or on shaft. If damage cannot be repaired, replace parts.

- (3) Inspect threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

f. Assembly (fig. 2-132, M730).

- (1) Install two bearings (29 and 32) in support arm housing (22) using replacer 12269522 (fig. 2-133).



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- 1 Hub
- 2 Support arm
- 3 Screw (2)
- 4 O-ring (2)
- 5 Plug (2)
- 6 Plug (2)
- 7 Screw (4)
- 8 Hubcap
- 9 Gasket
- 10 Cotter pin
- 11 Nut
- 12 Key washer
- 13 Bolt
- 14 Bearing
- 15 Seal
- 16 Bearing
- 17 Bearing cup

- 18 Bearing cup
- 19 Grease fitting
- 20 Relief valve
- 21 Cap screw (6)
- 22 Support arm housing
- 23 O-ring
- 24 Screw (6)
- 25 Tablock washer (3)
- 26 Seal
- 27 Retainer plate
- 28 Gasket
- 29 Bearing
- 30 Seal
- 31 Spacer
- 32 Bearing
- 33 Grease fitting
- 34 Relief valve

Figure 2-132. Road wheel support assembly - exploded view (M730)

(2) Apply light coat of grease to cork-rubber surface of new seal (30, fig. 2-132) (grease filled housing only).

(3) Install seal (30) and spacer (31) in support arm housing (22).

(4) Apply light coat of sealing compound MIL-S-45180 (8030-00-656-1426), to sealing surfaces of retainer plate (27), support arm (2), seal (26) and new gasket (28).

(5) Install new gasket (28) and retainer plate (27) in support arm housing (22). Using replacer 12269522 (fig. 2-133).

(6) Install new seal (26) in support arm housing (22) using replacer 12269522 (fig. 2-133).

(7) Coat bearing surfaces of road wheel support arm (2, fig. 2-132) with oil (oil filled housing only) or grease (grease filled housing only).

(8) Install road wheel support arm (2) in support arm housing (22).

(9) Install six screws (24) and three new tablock washers (25) in road wheel support arm (2). Do not tighten screws.

(10) Apply light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to threads of grease fitting (33) and relief valve (34) (grease filled housing only).

(11) Install grease fitting (33) and relief valve (34) in support arm (2) (grease filled housing only).

(12) Fill support arm housing with grease until grease appears around retainer plate (27) (grease filled housing only) (LO 9-1450-585-12).

(13) Tighten six screws (24) to 14 to 15 pound-foot torque. Bend tabs on tablock washers (25) to secure screws.

(14) Install new O-ring (23) on support arm housing (22).

(15) If shoulder bolt (13) was removed, install new bolt using heavy hammer.

(16) Apply light coat of sealing compound MIL-S-45180 (8030-00-656-1426), to threads of grease fitting (19) and relief valve (20) (grease filled housing only).

(17) Install grease fitting (19) and relief valve (20) in road wheel hub (1) (grease filled housing only).

(18) Install two bearing cups (17 and 18) in hub (1) using replacer 5120-00-678-2796 (fig. 2-128).

(19) Pack bearings (14 and 16, fig 2-132) and hub cavity (1) with grease (grease filled housing only) (LO 9-1450-585-12).

(20) Install bearings (14 and 16) in wheel hub (1).

(21) Apply light coat of sealing compound MIL-S-45180, (8030-00-656-1426) to outside surfaces of new seal.

(22) Install seal (15) in wheel hub (1) using replacer 5120-00-678-2797 (fig. 2-128).

(23) Install road wheel hub (1, fig. 2-132) on road wheel support arm (2). Secure with key washer (12) and nut (11).

(24) Tighten nut (11) to 140 to 150 pound-foot torque. Back off nut until no torque is applied.

(25) Tighten nut (11) 70 to 75 pound-foot torque. Back off nut to align with cotter pin hole in support arm. Install new cotter pin (10).

(26) Install new gasket (9) and hubcap (8) on wheel hub (1). Secure with four screws (7).

(27) Install two new O-rings (4) and screws (3) in hubcap (8) (oil filled housing only).

(28) Fill support arm bearing cavity with oil (oil filled housing only) (LO 9-1450-585-12).

(29) Apply light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to threads of plugs (5 and 6) (oil filled housing only).

(30) Install two plugs (6) in support arm (2) (oil filled housing only).

(31) Install lower plug (5) in wheel hub (1) (oil filled housing only).

(32) Fill wheel hub with oil (oil filled housing only).

(33) Install upper plug (5) in wheel hub (1) (oil filled housing only).

(34) Fill wheel hub (1) with grease (grease filled housing only).

g. Assembly (fig. 2-132.1, M730A1).

(1) Install two bearings (27 and 30) in support arm housing (19) using replacer 12269522 (fig. 2-133).

(2) Apply light coat of grease to cork-rubber surface of new seal (29, fig. 2-132.1).

(3) Install new seal (29) and spacer (28) in support arm housing (19).

(4) Apply light coat of sealing compound MIL-S-45180 (8030-00-656-1426), to sealing surfaces of retainer plate (25), support arm (8), new seal (24) and new gasket (28).

(5) Install new gasket (26) and retainer plate (25) in support arm housing (19).

(6) Install new seal (24) in support arm housing (19) using replacer 12269522 (fig. 2-133).

(7) Install road wheel support arm (8, fig 2-132.1) in support arm housing (19).

(8) Install six screws (22) and three new tablock washers (23) in road wheel support arm (8). Do not tighten screws.

(9) Apply light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to threads of grease fitting (31) and relief valve (32).

(10) Install grease fitting (31) and relief valve (32) in support arm (8).

(11) Fill support arm housing with grease (LO 9-1450-585-12) until grease appears around retainer plate (25).

(12) Tighten six screws (22) to 14 to 15 pound-feet torque. Bend tabs on tablock washers (23) to secure screws.

(13) Install new O-ring (21) on support arm housing (19).

(14) If pin (34) was removed, apply engine oil MIL-L-21260 (9150-00-111-0208) to tapered shaft of pin (34). Install pin (34) in support arm (8) and secure with nut (33). Tighten nut to 120 to 140 pound-feet torque.

(15) If shoulder bolt (16) was removed, install new bolt using a heavy hammer.

(16) Apply light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to threads of grease fitting (14) and relief valve (15).

(17) Install grease fitting (14) and relief valve (15) in road wheel hub (4).

(18) Install two bearing cups (12 and 13) in road wheel hub (4) using replacer 5120-00-678-2796 (fig. 2-128).

(19) Pack bearings (10 and 11, fig 2-132.1) with grease MIL-G-10924 (9150-00-190-0904).

(20) Completely fill road wheel hub cavity with grease (LO 9-1450-585-12).

(21) Install bearings (10 and 11) in wheel hub (4).

(22) Apply light coat of sealing compound MIL-S-45180 (8030-00-656-1426) to outer surfaces of new seal (9).

(23) Install new seal (9) in hub (1) using replacer 5120-00-678-2797 (fig. 2-128).

(24) Install road wheel hub (4, fig. 2-132.1) on road wheel support arm (8). Secure with key washer (7) and nut (6).

(25) Tighten nut (6) to 140 to 150 pound-feet torque. Back off nut until no torque is applied.

(26) Tighten nut (6) to 70 to 75 pound-feet torque. Back off nut to align with first cotter pin hole in shaft. Install new cotter pin (5).

(27) Install new gasket (3) and hubcap (2) on road wheel hub (4). Secure with four screws (1).

(28) Fill road wheel hub bearing cavity with grease (LO 9-1450-585-12).

h. Installation (fig 2-132, M730).

(1) Install support assembly in hull and secure with six cap screws (21). Tighten six screws (21) to 130 to 140 pound-feet torque.

(2) If front or rear road wheel support arm assembly was removed, install shock absorber (para 2-185).

(3) Install torsion bar (para 2-197).

(4) Install road wheels (para 2-196).

(5) Adjust track tension (TM 9-1450-585-10).

(6) Install track shroud (para 2-184).

i. Installation (fig. 2-132.1, M730A1).

(1) If first, second or last road wheel was removed, install road support arm assembly in hull. Secure with four bolts (20) and two bolts (17). Tighten bolts to 130 to 140 pound-feet torque.

(2) Install shock absorber (para 2-185).

(3) If third or fourth road wheel was removed, install road wheel support arm assembly in hull. Secure with four bolts (20). Do not tighten bolts.

(4) On third or fourth road wheel install guard (18) on support arm housing (19). Secure with two bolts (17). Tighten two bolts (17) and four bolts (20) to 130 to 140 pound-feet torque.

(5) Install torsion bar (para 2-197).

(6) Install road wheels (para 2-196).

(7) Adjust track tension (TM 9-1450-585-10).

(8) Install track shroud (para 2-184).

Legend to fig. 2-132.1.

- 1 Screw (4)
- 2 Hubcap
- 3 Gasket
- 4 Hub
- 5 Cotter pin
- 6 Nut
- 7 Key washer
- 8 Arm
- 9 Seal
- 10 Bearing
- 11 Bearing
- 12 Bearing cup
- 13 Bearing cup
- 14 Grease fitting
- 15 Relief valve
- 16 Bolt
- 17 Bolt (2)
- 18 Guard
- 19 Support arm housing
- 20 Bolt (4)
- 21 O-ring
- 22 Screw (6)
- 23 Tablock washer (3)
- 24 Seal
- 25 Retainer plate
- 26 Gasket
- 27 Bearing
- 28 Spacer
- 29 Seal
- 30 Bearing
- 31 Grease fitting
- 32 Relief valve
- 33 Nut
- 34 Pin

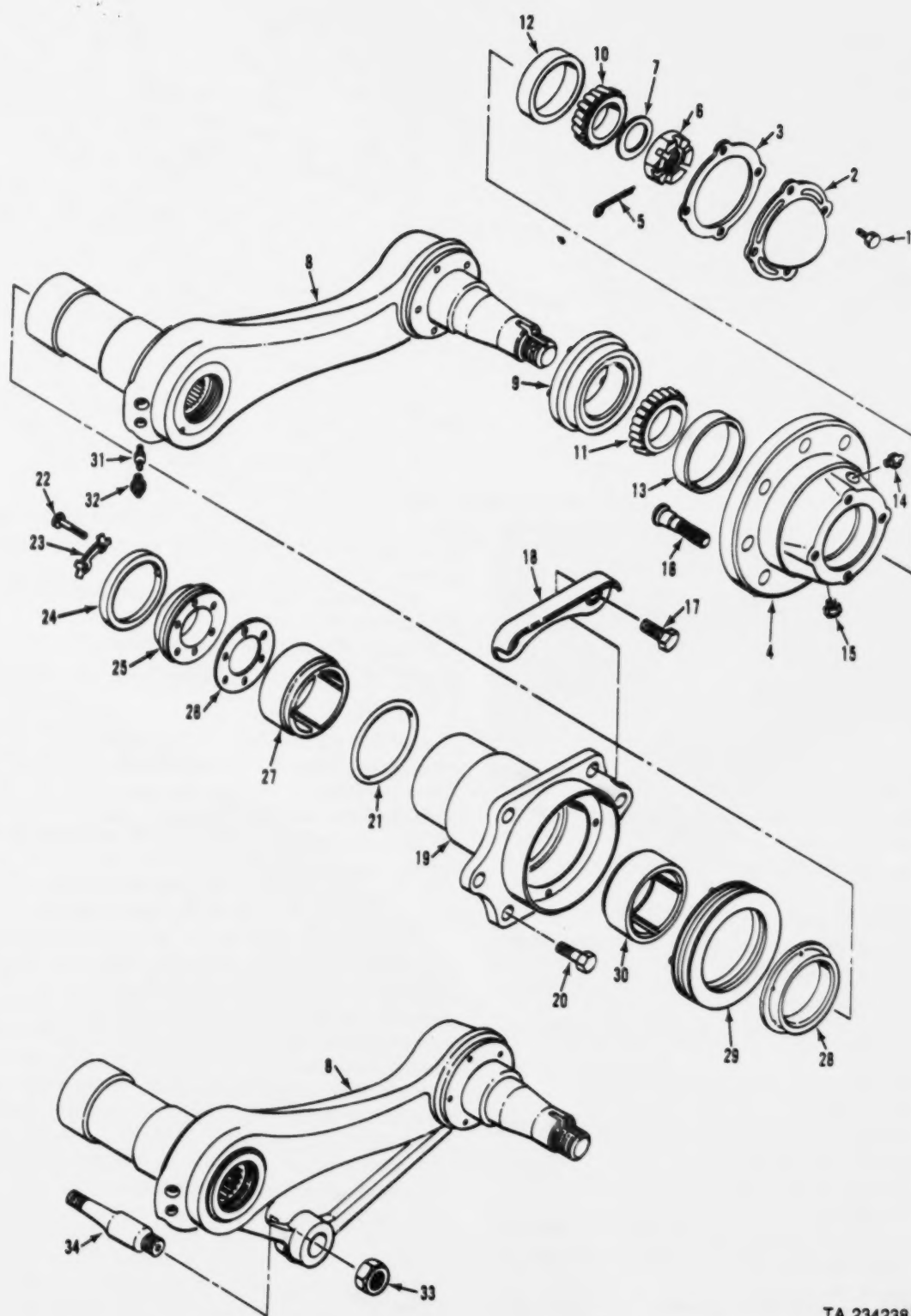
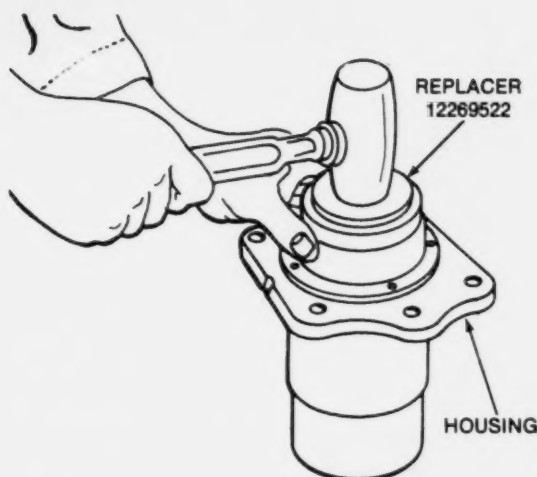


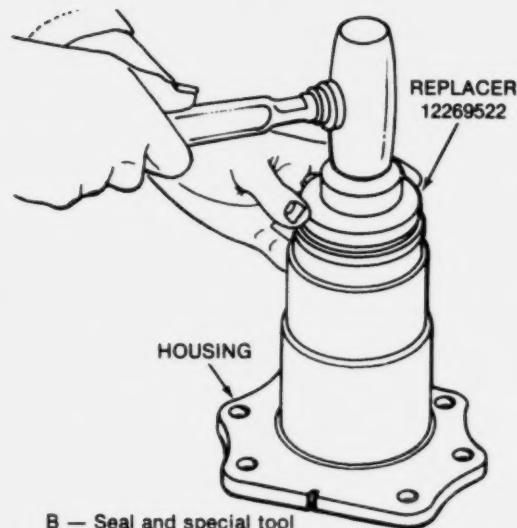
Figure 2-132.1. Road wheel support assembly - exploded view (M790A1).

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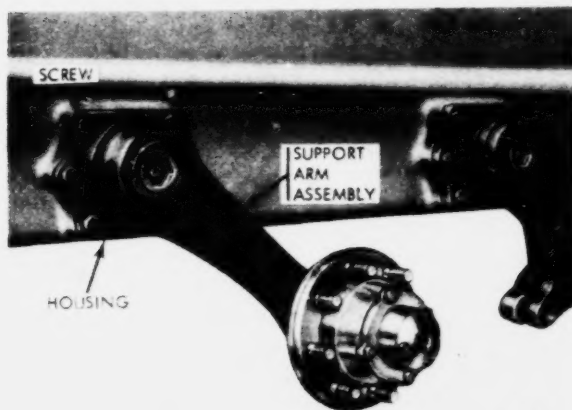
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A — Bearing and special tool



B — Seal and special tool

Figure 2-133. Using road wheel support housing bearing and seal replacer.



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Figure 2-134. Road wheel support assembly.

2-200. Road Wheel Support Arm Lubrication Conversion

a. Road Wheel Support Arm (fig. 2-132).

- (1) Remove road wheel support arm assembly (para 2-199).
- (2) Remove two pipe plugs from two oil fill opening in housing.
- (3) Install reducer and lubrication fitting (table 2-24) in forward oil opening.
- (4) Install reducer and relief valve (table 2-24) in rear oil fill opening.
- (5) Loosen six cap screws (24) securing retainer (27) to housing (22). Do not remove screws or retainer.
- (6) Fill housing with grease until lubricant flows freely around the bearing retainer (LO 9-1450-585-12).
- (7) Tighten six cap screws (24) securing retainer

(27) to housing (22) to 14 to 16 pound-feet torque. Bend tabs on retainer locking plate (25) to secure screws.

(8) Install road wheel support arm assembly (para 2-199).

b. Road Wheel Hub. Refer to paragraph 2-192.

2-201. Road Wheel Arm Rubber Bumper (fig. 2-135).

a. *Removal (M730).* Remove two nuts (1) and washers (2) that secure bumper (3) to support (4). Remove bumper.

b. Removal (M730A1).

- (1) Remove two nuts (1) and washers (2) that secure bumper (3) to support (4).
- (2) Remove screw (5) and two screws (6) that secure support (4) to hull. Remove support.

c. *Inspection and Repair.* Inspect bumper for loss of resiliency, cracks, breaks, and cuts. Replace bumper that shows any of these defects.

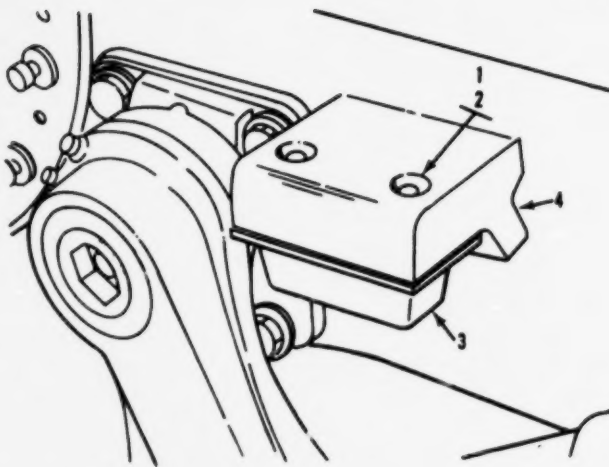
d. *Installation (M730).* Install bumper (3) on support (4). Secure with two nuts (1) and washers (2).

e. Installation (M730A1).

- (1) Place support (4) on hull. Secure with screw (5) and two screws (6). Tighten all screws to 315 to 325 pound-feet torque.
- (2) Install bumper (3) on support (4). Secure with two nuts (1) and washers (2).

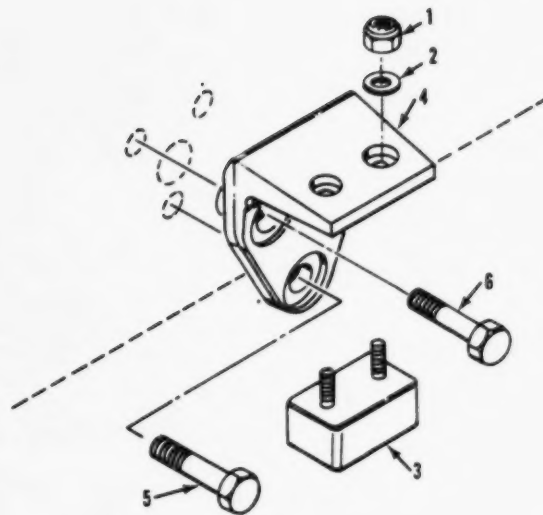
Legend to fig. 2-135.

- 1 Nut
- 2 Washer
- 3 Bumper
- 4 Support
- 5 Screw
- 6 Screw



M730

Figure 2-135. Road wheel support arm bumper.



M730A1

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Section XXIV. CONTROLS

2-202. General

a. Scope. This section contains instructions for removal, adjustment, disassembly and assembly, inspection and repair, and installation of controls described in *b* below.

b. Description.

(1) *Differential steering linkage and brake controls* (fig. 2-136). The right and left steering control levers transmit pressure applied by the operator through linkage, to the brake bands in the differential. The steering linkage must be adjusted to produce the same amount of movement at the differential brake levers when the right and left steering levers are moved an equal distance.

(2) *Pivot steering brake controls and linkage* (fig. 2-137 and 2-138). The right and left pivot steering hand levers each actuate a hydraulic master cylinder. The master cylinder, in turn, transmits hydraulic pressure to a brake assembly on the differential which applies pressure to a brake disk. The brake disks are attached to the output shafts of the differential, causing a restraining action on the output shafts when the brakes are applied. Self-adjusting release units in the brake assemblies compensate for lining wear and maintain clearance between the disk and lining when the brake is released.

(3) *Hand throttle control and fuel cutoff control* (fig. 2-139 and 2-140). The hand throttle control and fuel cutoff are push-pull, flexible control cables,

which can be turned to lock at any position. The handles mount on the instrument panel in the cab. The hand throttle cable attaches to the accelerator pedal. The fuel cutoff cable attaches to the engine governor link.

(4) *Accelerator pedal control and linkage* (fig. 2-139). The accelerator pedal transmits motion through linkage and a cross shaft to the governor throttle control lever and to the throttle valve in the transmission. The linkage must be adjusted so that the engine governor link is in full throttle position when the transmission throttle is in the detent position.

(5) *Transmission range selector control and linkage* (fig. 2-139). The range selector control link transmits motion through linkage and the cross shaft to the transmission shift arm. The linkages must be adjusted so the range selector lever position corresponds to the gear range selected in the transmission.

(6) *Engine disconnect control* (fig. 2-154). The engine disconnect control operates a lever in the transfer gearcase to disengage the engine from the gear train of the transfer gearcase. The disconnect control does not disengage the generator pulley, which drives from the input gear position. A lock on the control keeps the engine and transfer gearcase engaged unless unlocked by the operator. The engine must be stopped to engage or disengage the disconnect.

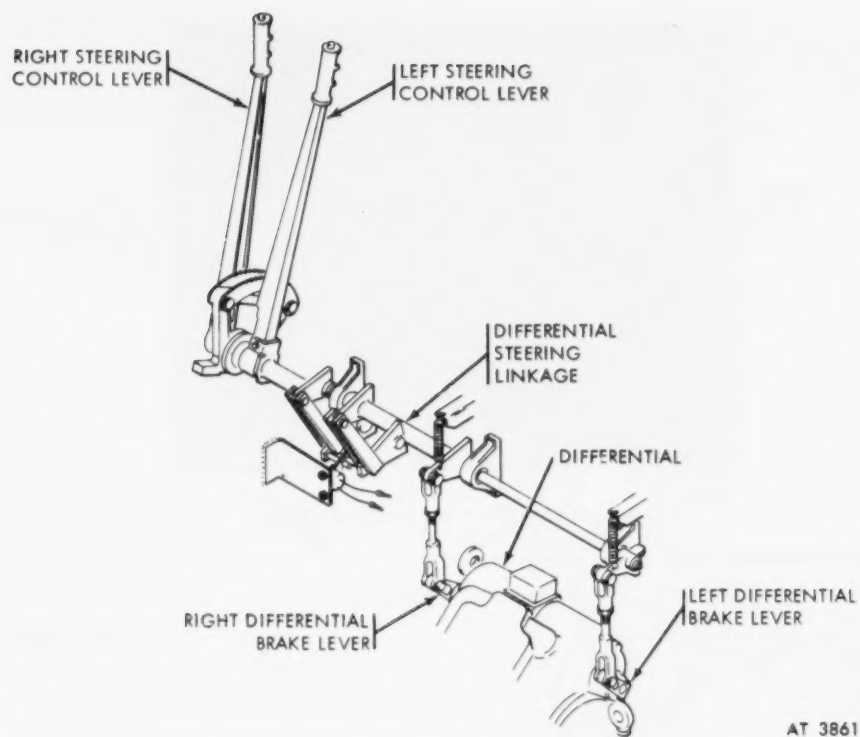


Figure 2-136. Differential steering brake controls and linkage.

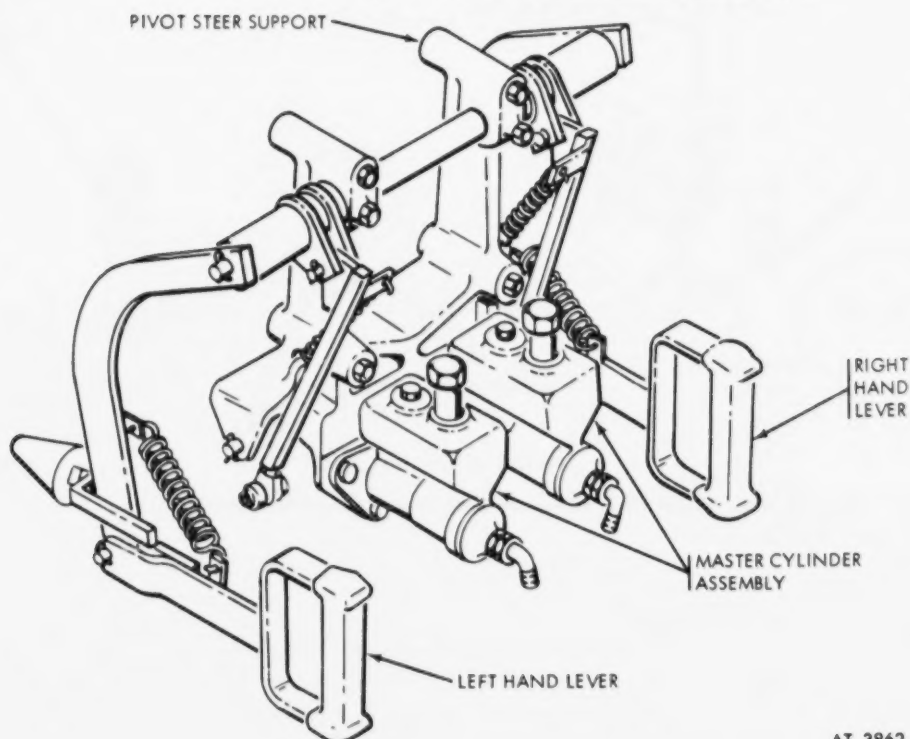


Figure 2-137. Pivot steering brake controls and linkage.

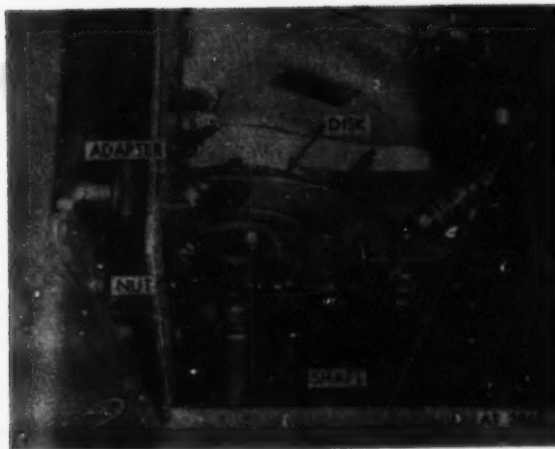
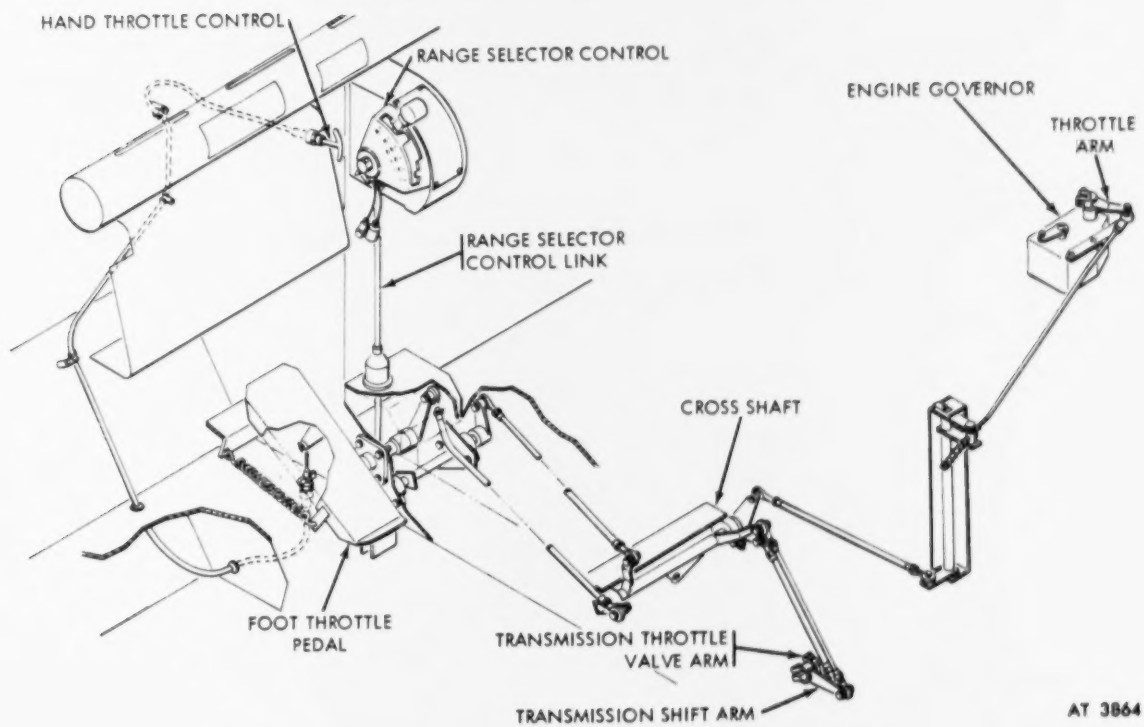


Figure 2-138. Pivot steering brake disk.



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Figure 2-139. Hand throttle, accelerator pedal, and range selector controls.

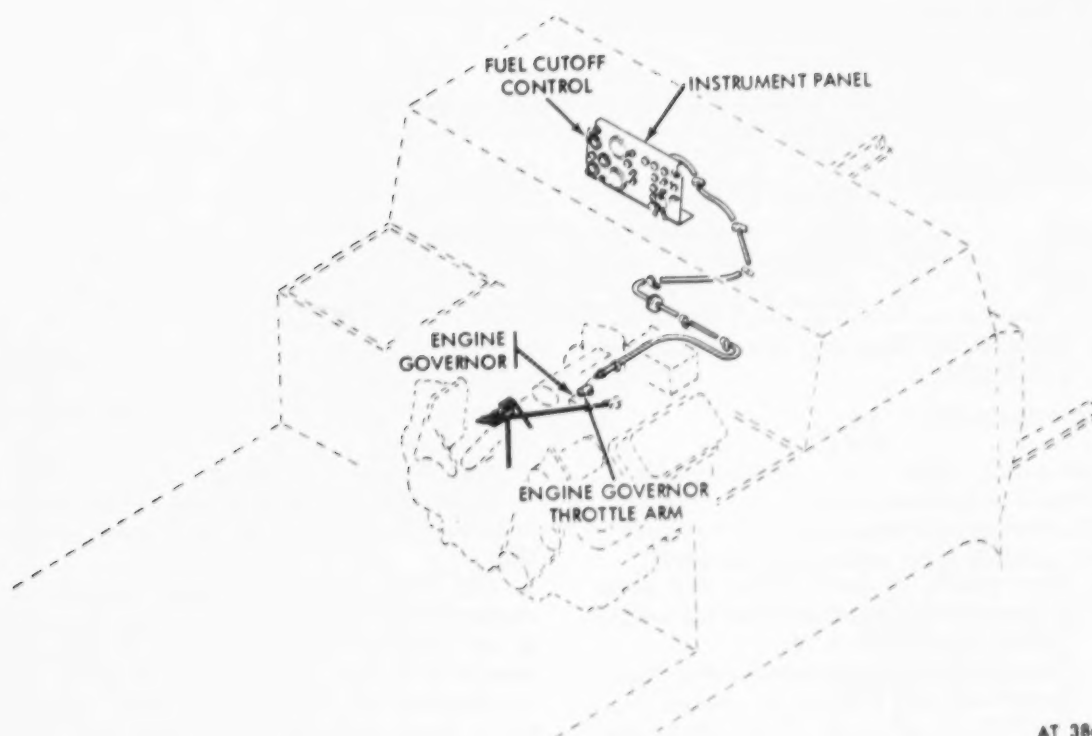


Figure 2-140. Fuel cutoff control.

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DELETED.

Figure 2-141. Engine disconnect control.

c. *Torque Wrench Specifications.* Refer to table 2-25 for torque tightness readings for the more critical points of the controls.

Table 2-25. Controls Torque Wrench Specifications

Fig. No.	Key No.	Location	Pound-feet torque
2-138	...	Nuts securing brake disk and adapter to differential.	75-80
2-143	11	Actuator arm screw	20-25
2-143	24	Left control shaft nut	17-20
2-145	19	Screws securing brake assembly, brake tube, and straps to differential.	100-110

2-203. Differential Steering Brake Controls and Linkage

a. Adjustment (fig. 2-142).

NOTE

Normally, adjustment of differential brake linkage is necessary only when the differential or a component of the control linkage has been repaired or replaced.

(1) Place vehicle on level surface and place wooden blocks in front and rear to block the tracks.

(2) Unlock steering levers (5).

(3) Open and secure engine compartment door.

(4) Remove steering lever return springs (14).

(5) Remove two cotter pins (7) and clevis pins (8) securing steering control rod clevises (9 and 11) to actuator arm (6) and levers (13). Discard cotter pins.

(6) Remove two screws (16) and nuts (17) attaching the steering lever quadrants (1) and stops (18) to bracket (19). Remove quadrants and stops.

(7) Inspect both sides of the quadrants teeth (1) for protrusions. If tips of teeth protrude to the side, grind excess metal off to form a slight taper (see section A-A).

(8) Position the quadrants (1) and stops (18) on the bracket (19) and secure with two screws (16) and nuts (17). Push down on the quadrants while tightening screws and nuts.

(9) Using 5/32 inch diameter rod, screw, or the shank of a 5/32 inch drill bit. Check the gap between the pawls (4) and tops of the quadrants (1) while moving the steering lever (5) from front to back. Gap must be 5/32 inch through entire range of travel. If gap is incorrect, see steps (10) through (23). If gap is correct, see steps (16) through (23).

(10) Loosen guide nuts (20) in tops of steering levers (5) and pull steering arm rod (2) assemblies up until pawls (4) clear quadrants.

(11) Loosen pawl jam nuts (3).

(12) To adjust the pawl/quadrant clearance the pawl (4) must be turned. One complete turn will move the pawl 1/32 inch. Clearance should be between 5/32 and 7/32 inch.

(13) Tighten jam nuts (3).

(14) Install the starting arm rod (2) assemblies into the steering levers (5) and tighten guide nuts (20).

(15) Using a 5/32 inch diameter rod, screw, or the shank of a drill bit (go gage), check gap between pawl (4) and quadrant (1) while moving steering lever (5) from front to back. Gage should fit. Using a 15/64 inch diameter rod, screw, or drill shank (no go gage), try to check same gap. The 15/64 inch diameter should not fit.

(16) Lock both steering arm assemblies (5) in first notch of quadrant (1).

Legend to fig 2-142.

- 1 Steering arm quadrant (2)
- 2 Steering arm rod (2)
- 3 Jam nut (2)
- 4 Steering arm pawl (2)
- 5 Steering arm assembly (2)
- 6 Actuator arm (2)
- 7 Cotter pin (4)
- 8 Clevis pin (2)
- 9 Upper clevis (2)
- 10 Clevis jam nut (2)
- 11 Lower clevis (2)
- 12 Index screw
- 13 Differential brake lever (2)
- 14 Return spring (2)
- 15 Stop light switch
- 16 Screw (2)
- 17 Nut (2)
- 18 Stop (2)
- 19 Bracket (2)
- 20 Guide nut (2)

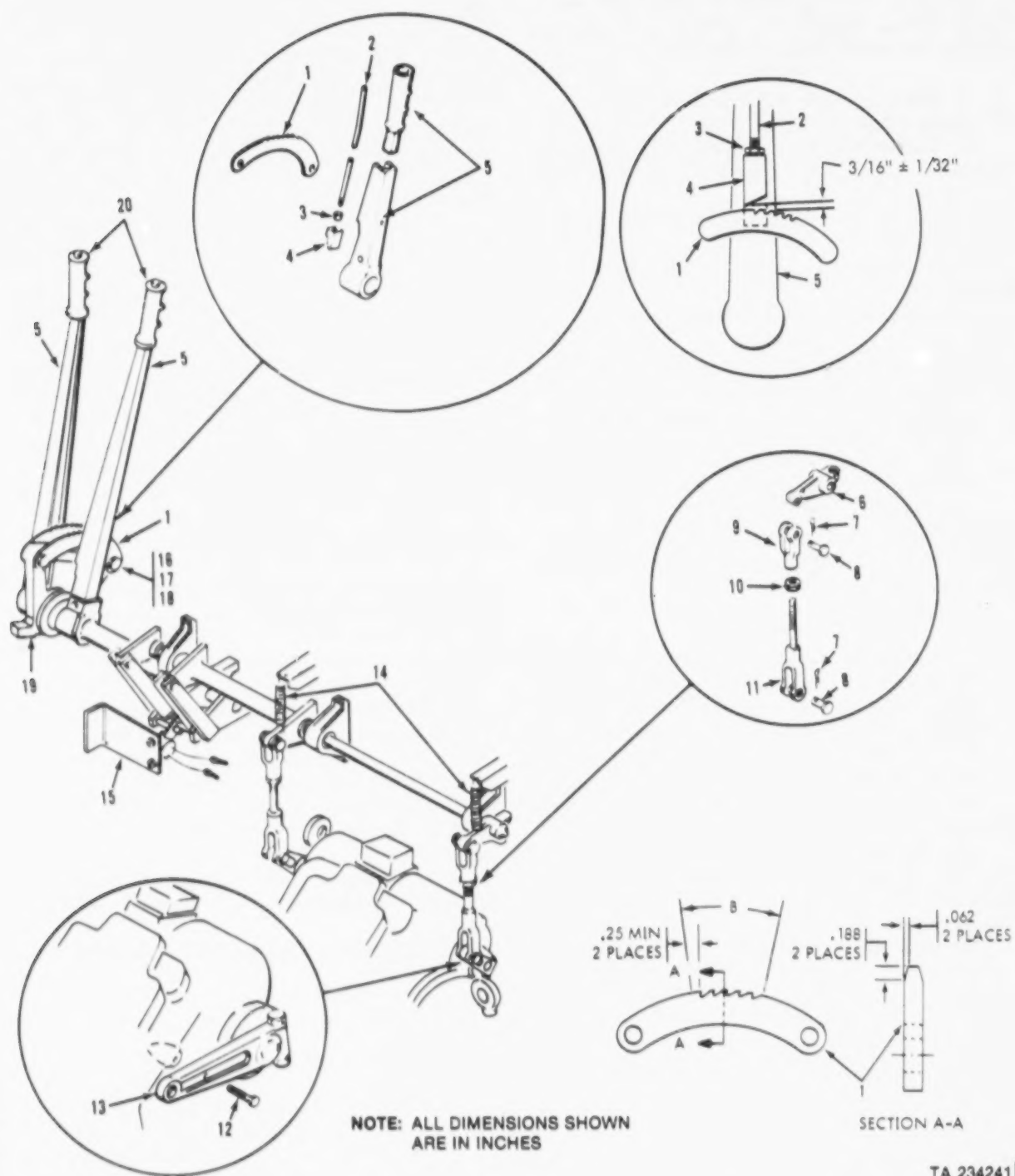


Figure 2-142. Differential steering brake controls and linkage adjustment.

(17) Aline indexing holes in differential brake levers (13) with tapped indexing holes in differential housing, and secure index screws (12).

NOTE

If indexing holes will not aline, loosen brake adjustment (para 2-162).

(18) Loosen clevis nut (10), and turn clevis (11) until hole in differential brake lever (13) alines with holes in clevis (11).

(19) Install two pins (8) and cotter pins (7), and tighten nut (10).

(20) Remove index screw (12) from differential brake lever (13).

(21) Install steering lever return springs (14).

CAUTION

Make certain button on top of lever works up and down freely. The pawl must fully engage ratchet with lever back and button depressed. The button must pop up by itself after pawl engagement with slight rearward pressure on lever. The plunger rod assembly must not bind.

(22) Close engine compartment door.

(23) Remove wooden blocks from tracks.

b. Removal and Disassembly

(fig. 2-143)

NOTE

Normally, complete removal and disassembly of steering brake controls and linkage is not necessary. Remove or disassembly only those parts necessary for performance of required maintenance.

(1) Raise and secure center personnel seat.

(2) Remove left and right driver's floor plates (para 2-222).

(3) Remove four cotter pins (14) and clevis pins (16) securing four connecting links (45) to shafts (1, 10, 25, and 37), and remove links. Discard cotter pins.

(4) Remove two nuts (34), four washers (33),

and two screws (35) securing quadrant bracket (57) to driver's floor, and remove shim(s) (32).

(5) Remove two screws (40) and washers (41) securing bearing unit (48) to hull, and remove bearing unit, quadrant bracket (57), left and right steering arms (39 and 21), and left and right control shafts (37 and 25) as a unit from carrier.

(6) Remove two alining pins (47) from bearing unit (48) or hull.

(7) Remove nut (24) and screw (26) securing left steering arm (39) to left control shaft (37), and remove steering arm and key (38).

(8) Loosen setscrew(s) on bearing unit (48), and remove left control shaft (37), spacer washer (30), spacer washer(s) (42), and bearing unit from right control shaft (25).

(9) Remove nut (24) and screw (26) securing right steering arm (21) to right control shaft (25), and remove steering arm.

(10) Remove two nuts (29), screw (58), stop screw (59), and two quadrant stops (55) securing two steering arm quadrants (56) to quadrant bracket (57), and remove steering arm quadrants.

(11) Remove two bearing retainer rings (31) securing bracket bearing (36) to quadrant bracket (57), and remove bearing.

(12) Disassemble two steering arms (21 and 39):

NOTE

Right and left steering arms are similar and are disassembled in a similar manner.

(a) Remove locknut (23) and screw (22) from steering arm to be disassembled.

(b) Loosen locknut (28), and remove steering arm pawl (27) and locknut from steering arm rod (54).

(c) Unscrew guide (50), and remove rod (54) assembled with button (49), guide, and collar (51).

(d) Remove spring (52) and bushing (53).

(e) Remove two pins (20), and remove button (49), guide (50), and collar (51) from rod (54).

(13) Remove seal clamp (43) securing shaft flexible seal (44) to shaft (25), and remove seal.

(14) Remove two return springs (9).

(15) Remove four cotter pins (14) and four clevis pins (16) from upper clevises (17) and lower clevises (19) securing two pairs of assembled clevises to actuator arm (12), outer shaft (10), and two differential arms, and remove two pairs of assembled clevises. Discard cotter pins.

(16) Loosen two locknuts (18), and remove two upper clevises (17) from two lower clevises (19).

(17) Loosen screw (11) securing actuator arm (12) and key (13) to inner shaft (1), and remove actuator arm (12) and key (13).

(18) Remove 6 nuts (7), 12 washers (6), 6 screws (46), and all bearing shims (5) securing three bearing housings (4) to center seat support, and remove shaft (1) assembled with outer shaft (10) and three bearing housings (4).

(19) Remove two housings (4) and outer shaft (10) from inner shaft (1).

(20) Remove housing (4) from shaft (1).

(21) Remove three lubrication fittings (3) from three housings (4).

(22) Remove six retainer rings (2) securing three shaft bearings (8) in three housings (4), and remove three bearings (8).

c. Inspection and Repair.

(1) Inspect bearings for rough and uneven rotation. Replace bearings that show either of these defects.

(2) Inspect bores of bearing housings and mating shafts for grooves, burs, and galls that indicate bearing has been turning in the housing or on shaft. Replace parts that show any of these defects.

(3) Inspect sleeve bearings for bore wear, grooves, and scratches. Replace bearings that show any of these defects.

(4) Inspect springs for weak or broken condition. Replace springs that show either of these defects.

d. Assembly and Installation (fig. 2-143).

(1) Install three bearings (8) in three housings (4), and secure with six retainer rings (2).

(2) Install three lubrication fittings (3) in housings (4).

(3) Install one housing (4), outer shaft (10), and two housings (4) on inner shaft (1).

(4) Position shaft (1) assembled with housings (4) and other shaft (10) on center seat support, adjust with shims (5) as required to permit free

rotation of shafts, and secure with 12 washers (6), 6 screws (46), and nuts (7).

(5) Position actuator arm (12) on inner shaft (1), and secure with key (13) and screw (11). Tighten screw to 20 to 25 pound feet torque.

(6) Install two locknuts (18) and upper clevises (17) on two lower clevises (19), and secure clevises with locknuts.

(7) Position two pairs of assembled clevises (17 and 19) in carrier, with lower clevises (19) on two differential arms, one upper clevis (17) on actuator arm (12), and one upper clevis (17) on outer shaft (10), and secure with four clevis pins (16) and four new cotter pins (14).

(8) Install two return springs (9).

(9) Assemble two steering arms (21 and 39):

NOTE

Right and left steering arms are similar and are assembled in a similar manner.

(a) Install collar (51), guide (50), and button (49) on steering arm rod (54), and secure collar and button with two pins (20).

(b) Install bushing (53) and spring (52) in steering arm (21 or 39).

(c) Install rod (54) assembled with button (49), guide (50), and collar (51) in steering arm (21 or 39), and screw guide into arm to secure assembly.

(d) Install locknut (28) and pawl (27) on rod (54), and secure pawl with locknut.

(e) Install screw (22), and secure with locknut (23).

(10) Install bearing (36) in quadrant bracket (57), and secure with two bearing retainer rings (31).

(11) Position two steering arm quadrants (56) and stops (55) on quadrant bracket (57), and secure with stop screw (59), screw (58), and two nuts (29).

NOTE

Mount steering arm quadrants on quadrant bracket with teeth pointing in opposite direction of arrow on bracket, and mount stops on bracket end in direction of arrow.

(12) Position right steering arm (21) on right control shaft (25), and secure with screw (26) and nut (24).

(13) Install bearing unit (48) on left control shaft (37) so that setscrew(s) is adjacent to shaft lever, and secure setscrew(s) on bearing unit.

(14) Install spacer washer(s) (42) on shaft (37) as required to obtain proper engagement of right steering arm (21), pawl (27), and quadrant (56). Insert shaft (37) through shaft (25), and install one spacer washer (30) and quadrant bracket (57) on shaft (37).

(15) Position key (38) and left steering arm (39) on left control shaft (37) to obtain proper engagement of pawl (27) and quadrant (56), and secure with screw (26) and nut (24). Tighten nut to 17 to 20 pound-feet torque.

(16) Position bearing unit (48) and quadrant bracket (57) with left and right control shafts (37) and 25) and left and right steering arms (39 and 21) attached in carrier, and secure as follows:

(a) Install two alining pins (47) in bearing unit (48).

(b) Install two screws (40) and washers (41) to secure bearing unit.

NOTE

Add washer(s) (41) under screw heads on bearing unit to make certain screws do not extend beyond top of mounting bracket.

(c) Install two screws (35), four washers (33), and two nuts (34) to secure quadrant bracket to driver's floor. Do not tighten nuts.

(17) Adjust bracket (57) as follows:

(a) With steering arms (21 and 39) fully forward, install shims (32) under front of bracket (57) so steering arms clear instrument panel by $2\frac{1}{8}$ to $2\frac{3}{8}$ inches at point of nearest approach.

(b) Pull steering arms (21 and 39) to last notch in quadrants (56), and install shims (32) under rear of bracket (57) so steering arms clear driver's seat.

(c) Tighten screws (35) and nuts (34).

(18) Position four connecting links (45) to shafts (1, 10, 25, and 37), and secure with four clevis pins (16) and new cotter pins (14).

(19) Install left and right driver's floor plates (para 2-222).

(20) Position shaft flexible seal (44) on shaft (25), and push tight against bulkhead. Position seal clamp (43) $\frac{1}{8}$ to $\frac{3}{8}$ inch from right end of seal, and tighten clamp until seal is snug on shaft.

(21) Adjust arms and linkage (a above).

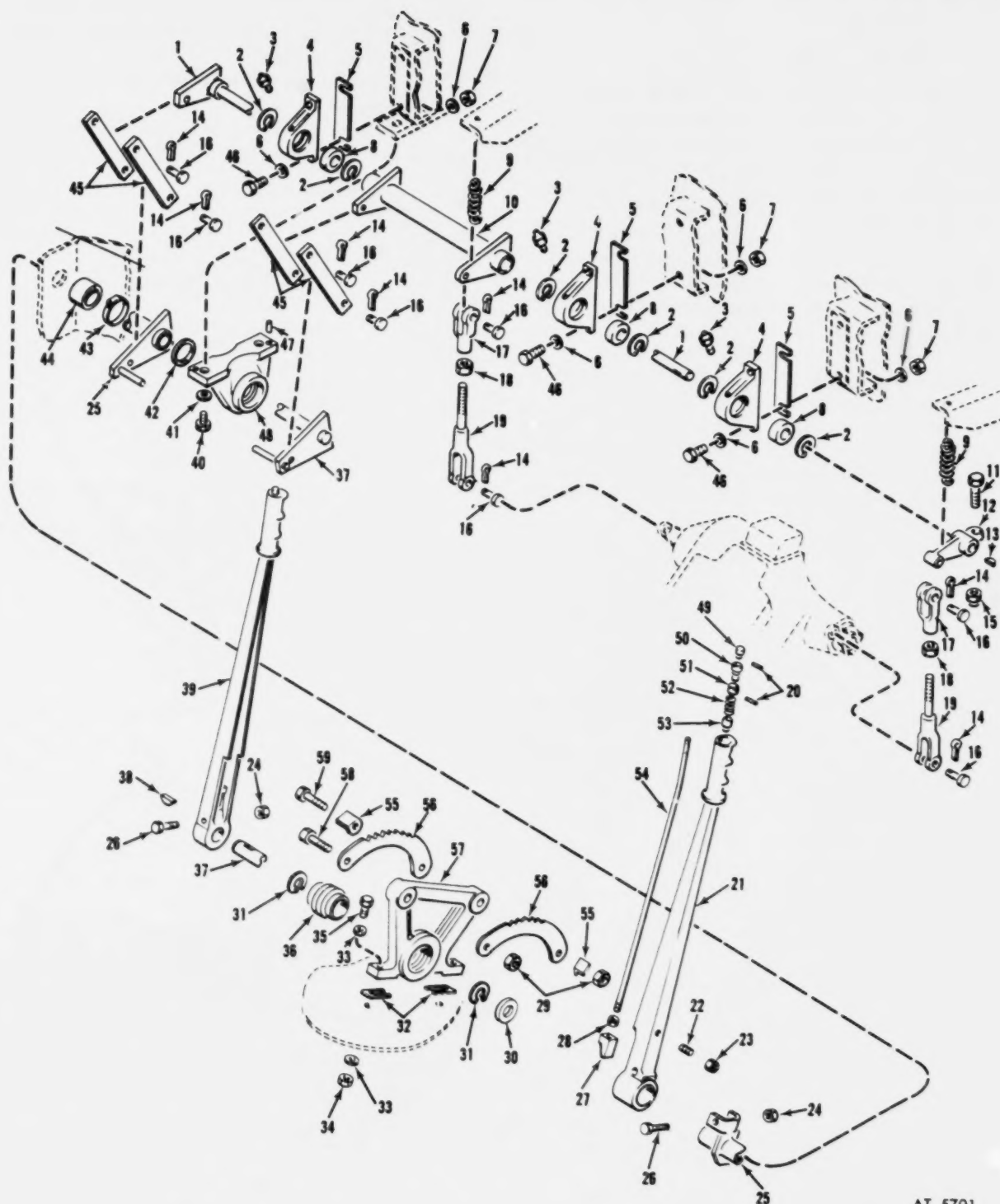
(22) Adjust steering brakes (para 2-162).

(23) Adjust stop light switch (para 2-129).

(24) Lower and secure center personnel seat.

Legend to fig. 2-143

- | | |
|------------------------|---------------------------|
| 1 Inner shaft | 30 Spacer washer |
| 2 Retainer ring | 31 Bearing retainer ring |
| 3 Lubrication fitting | 32 Bracket shim |
| 4 Bearing housing | 33 Bracket washer |
| 5 Bearing shim | 34 Bracket nut |
| 6 Bearing washer | 35 Bracket screw |
| 7 Bearing nut | 36 Bracket bearing |
| 8 Shaft bearing | 37 Left control shaft |
| 9 Return spring | 38 Left control shaft key |
| 10 Outer shaft | 39 Left steering arm |
| 11 Actuator arm screw | 40 Bearing unit screw |
| 12 Actuator arm | 41 Bearing unit washer |
| 13 Actuator arm key | 42 Bearing spacer washer |
| 14 Cotter pin | 43 Seal clamp |
| 15 Actuator arm nut | 44 Shaft flexible seal |
| 16 Clevis pin | 45 Connecting link |
| 17 Upper clevis | 46 Bearing screw |
| 18 Clevis locknut | 47 Alining pin |
| 19 Lower clevis | 48 Bearing unit |
| 20 Steering arm pin | 49 Steering arm button |
| 21 Right steering arm | 50 Steering arm guide |
| 22 Index screw | 51 Steering arm collar |
| 23 Index locknut | 52 Steering arm spring |
| 24 Control shaft nut | 53 Steering arm bushing |
| 25 Right control shaft | 54 Steering arm rod |
| 26 Control shaft screw | 55 Quadrant stop |
| 27 Steering arm pawl | 56 Steering arm quadrant |
| 28 Rod locknut | 57 Quadrant bracket |
| 29 Quadrant nut | 58 Quadrant screw |
| | 59 Quadrant stop screw |



AT 5701

Figure 2-143. Differential steering brake controls and linkage—exploded view.

2-204. Pivot Steering Brake Controls and Linkage

a. Adjustment (fig. 2-144).

NOTE

The following procedure applies to both left and right pivot steering linkages.

(1) Loosen nut (11), and turn rubber bumper (10) in or out to set left hand lever (2) to maintain $3\frac{1}{4}$ inches from rear support (1) to forward edge of left hand lever (2). Tighten nut (11).

(2) Loosen nut (6), and turn bearing (7) in to shorten or out to lengthen connecting link (5) as required to obtain approximately $1\frac{1}{32}$ inch free play between clevis (9) and piston (8) of master cylinder assembly (4).

NOTE

Piston of master cylinder assembly must be fully retracted.

(3) Remove filler cap of hydraulic master cylinder assembly (25, fig. 2-145), and check fluid level. Add hydraulic fluid (OHA or OHT) to fill master cylinder assembly to $\frac{1}{2}$ to $\frac{3}{4}$ inch from top.

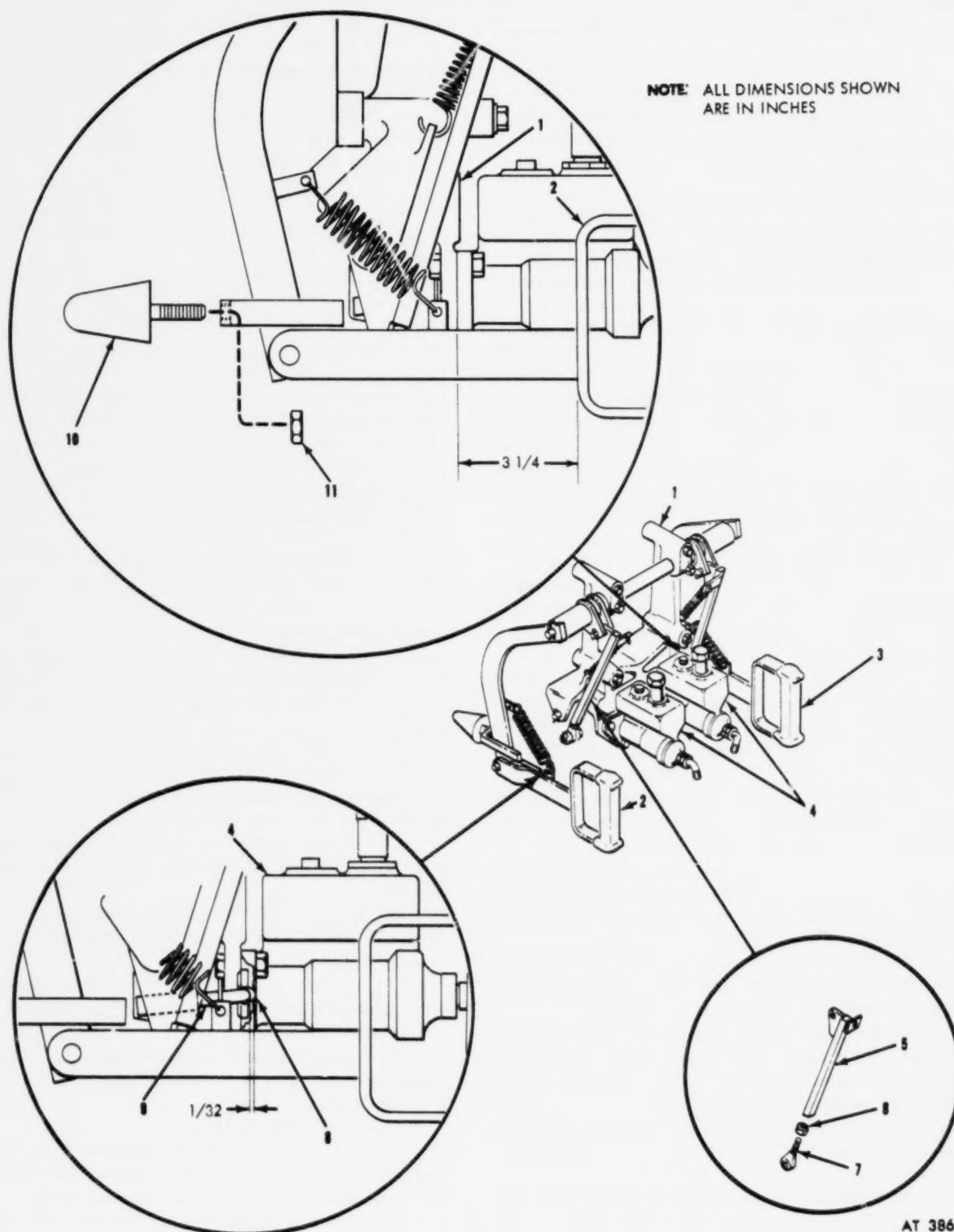
(4) Pull back hard and hold left hand lever (2, fig. 2-144) in applied position, and open bleeders (23, fig. 2-146) until discharge at bleeder is clear and free of air bubbles.

(5) With bleeders closed, recheck fluid level in master cylinder assembly.

(6) Repeat steps (3), (4), and (5) above for right brake assembly (fig. 2-146).

Legend to fig. 2-144.

- 1 Pivot steer support
- 2 Left hand lever
- 3 Right hand lever
- 4 Master cylinder assembly
- 5 Connecting link
- 6 Connecting link jam nut
- 7 Rod end bearing
- 8 Master cylinder piston
- 9 Master cylinder clevis
- 10 Rubber bumper
- 11 Bumper jam nut



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Figure 2-144. Pivot steering brake controls and linkage adjustment.

b. Removal (fig. 2-145).

- (1) Partially remove instrument panel (para 2-92).

NOTE

Exercise care in partially removing instrument panel to prevent disconnecting instrument or light connectors. Connect any lead immediately if connector is disconnected.

- (2) Loosen screw securing two clamps to top of hull behind instrument panel, and pull wiring harness through loosened clamps.

- (3) Remove two upper screws (2) and washers (1).

- (4) Temporarily install instrument panel (para 2-92).

- (5) Remove two tube nuts (29) and sleeves (28), and disconnect two tubes (30) from two elbows (27) on two master cylinder assemblies (25).

- (6) Support pivot steer assembly (3), remove two lower screws (2) and washers (1), and remove pivot steer assembly (3) by rotating downward and backward.

c. Disassembly (fig. 2-145).

- (1) Loosen two elbow locking nuts, and remove two elbows (27) and two packings (26) from two master cylinder assemblies (25). Discard packings.

- (2) Remove six nuts (47) and screws (31) securing two master cylinder assemblies (25) to pivot steer support (4), and remove two master cylinder assemblies and two bellows (32). Discard bellows.

- (3) Remove two arm return springs (19) from right and left hand levers (20 and 37) and right and left hand lever arms (9 and 39).

- (4) Remove two cotter pins (18) and two clevis pins (21), and remove right and left hand levers (20 and 37) from right and left hand lever arms (9 and 39). Discard cotter pins.

- (5) Remove two jam nuts (38) securing two rubber bumpers (8) to right and left hand lever arms (9 and 39), and remove bumpers.

- (6) Remove cotter pin (40) and spacer washers (10) from inner cross shaft (11), and remove left hand lever arm (39) and two washers (5) from outer cross shaft (6).

- (7) Remove two link return springs (14) from pivot steer support (4) and from two connecting links (15).

- (8) Remove two nuts (17), washers (23), and screws (35) securing two connecting links (15) to right and left hand outer shaft levers (46 and 36).

- (9) Remove two cotter pins (13) and two clevis pins (12) securing two connecting links (15)

to right and left hand lever arms (9 and 39), and remove links. Discard cotter pins.

- (10) Loosen two nuts (16), and remove two rod end bearings (22) and nuts from two connecting links (15).

- (11) Remove inner cross shaft (11), right hand lever arm (9), and two washers (10 and 5) from pivot steer support (4).

- (12) Remove locking wire (43) and two screws (44) securing outer cross shaft (6) to pivot steer support (4), and remove shaft. Discard locking wire.

- (13) Remove two cotter pins (34) and two clevis pins (33) securing two master cylinder clevises (24) to right and left hand outer shaft levers (46 and 36), and remove clevises. Discard cotter pins.

- (14) Remove two cotter pins (42), and remove cross shaft (41), left hand outer shaft lever (36), and right hand outer shaft lever (46) from support (4). Discard cotter pins.

- (15) If bearings are to be replaced in right and left hand lever arms (9 and 39), remove two sleeve bearings (7) from each arm.

- (16) If bearings are to be replaced in right and left hand outer shaft levers (46 and 36), remove two sleeve bearings (45) from each lever.

d. Inspection and Repair.

- (1) Inspect hand levers, arms, clevises, and shafts for cracks and excessive wear on bearing surfaces. Replace parts that show either of these defects.

- (2) Inspect rod end bearings for rough or uneven rotation and excessive wear. Replace rod end bearing or end and bearing assembly that shows either of these defects.

- (3) Inspect springs for tension loss and broken condition. Replace springs that show either of these defects.

- (4) Inspect all threaded components for damaged threads. Replace components that have damaged threads.

- (5) Inspect bellows for loss of resiliency, cracks, breaks, and cuts. Replace bellows that show any of these defects.

- (6) Inspect sleeve bearings for scores and excessive wear. Replace bearings that show either of these defects.

e. Assembly (fig. 2-145).

- (1) If bearings have been removed from right and left hand outer shaft levers (46 and 36), install two new sleeve bearings (45) in each lever.

- (2) If bearings have been removed from right and left hand lever arms (9 and 39), install two new sleeve bearings (7) in each arm.

- (3) Install right hand outer shaft lever (46),

left hand outer shaft lever (36), and cross shaft (41) in pivot steer support (4), and secure with two new cotter pins (42).

(4) Position to master cylinder clevises (24) to right and left hand outer shaft levers (46 and 36), and secure with two clevis pins (33) and two new cotter pins (34).

(5) Position outer cross shaft (6) in pivot steer support (4), and secure with two screws (44) and new locking wire (43).

(6) Install two washers (10 and 5), right hand lever arm (9), and inner cross shaft (11) in pivot steer support (4). Install spacer washers (10) as required to take up end play.

(7) Install two nuts (16) and two rod end bearings (22) on two connecting links (15).

(8) Position two connecting links (15) to right and left hand lever arms (9 and 39), and secure with two clevis pins (12) and two new cotter pins (13).

(9) Position opposite end of two connecting links (15) to right and left hand outer shaft levers (46 and 36), and secure with two screws (35), washers (23), and nuts (17).

(10) Connect two link return springs (14) to pivot steer support (4) and to two connecting links (15).

(11) Install two washers (5) and left hand lever arm (39) on outer shaft (6), install spacer washers (10) as required on inner cross shaft (11), and secure with new cotter pin (40).

(12) Position two rubber bumpers (8) to right and left hand lever arms (9 and 39), and secure with two jam nuts (38).

(13) Position right and left hand levers (20

and 37) to right and left hand lever arms (9 and 39), and secure with two clevis pins (21) and two new cotter pins (18).

(14) Connect two arm return springs (19) to right and left hand lever arms (9 and 39) and to right and left hand levers (20 and 37).

(15) Position new bellows (32) on two master cylinder assemblies (25), position two master cylinder assemblies on pivot steer support (4), and secure with six screws (31) and nuts (47).

NOTE

Make sure that two bellows (32) are installed on two master cylinder clevises (24).

(16) Install two new packings (26) and two elbows (27) on two master cylinder assemblies (25), and secure two elbow locking nuts.

f. Installation (fig. 2-145).

(1) Position pivot steer assembly (3) in carrier by rotating forward and upward. Aline two lower mounting holes, and install two washers (1) and screws (2).

(2) Connect two tubes (30) to two elbows (27) on two master cylinder assemblies (25), and secure with two tube sleeves (28) and nuts (29).

(3) Partially remove instrument panel (para 2-92).

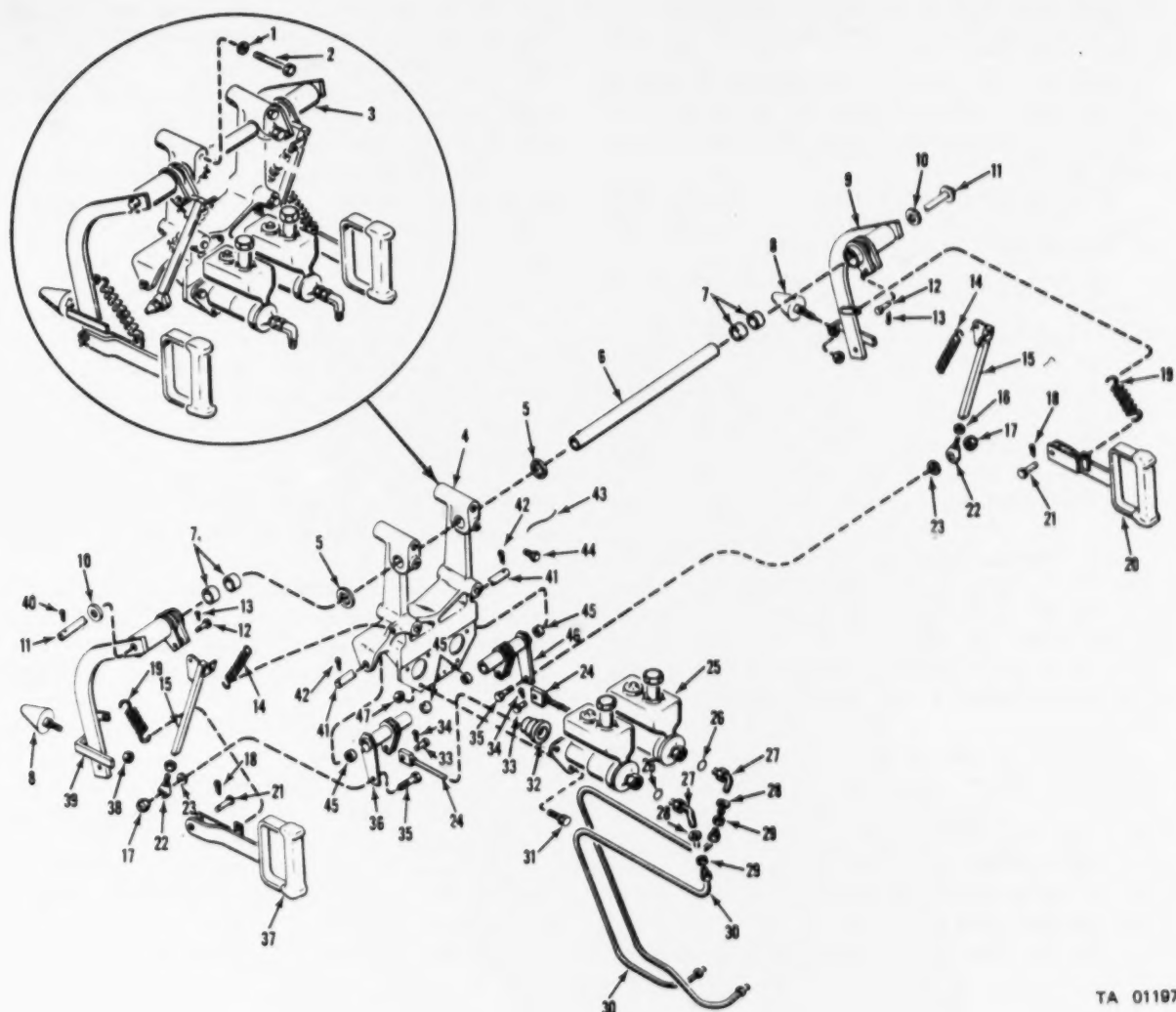
(4) Install two washers (1) and screws (2) in upper mounting holes.

(5) Push wiring harnesses back through two clamps, and tighten screw to secure harnesses to top of hull behind instrument panel.

(6) Install instrument panel (para 2-92).

(7) Fill and bleed pivot steering hydraulic system (para 2-222).

(8) Adjust pivot steering linkages (a above).



TA 011975

- | | | |
|-------------------------------|---------------------------------|---------------------------------|
| 1 Support washer | 17 Bearing nut | 32 Cylinder bellows |
| 2 Support screw | 18 Hand lever clevis cotter pin | 33 Outer shaft clevis pin |
| 3 Pivot steer assembly | 19 Arm return spring | 34 Clevis cotter pin |
| 4 Pivot steer support | 20 Right hand lever | 35 Bearing screw |
| 5 Outer cross shaft washer | 21 Hand lever clevis pin | 36 Left hand outer shaft lever |
| 6 Outer cross shaft | 22 Rod end bearing | 37 Left hand lever |
| 7 Lever arm sleeve bearing | 23 Bearing washer | 38 Rubber bumper jam nut |
| 8 Rubber bumper | 24 Master cylinder clevis | 39 Left hand lever arm |
| 9 Right hand lever arm | 25 Master cylinder assembly | 40 Inner shaft cotter pin |
| 10 Spacer washer | 26 Cylinder elbow packing | 41 Cross shaft |
| 11 Inner cross shaft | 27 Cylinder elbow | 42 Cross shaft cotter pin |
| 12 Hand lever arm clevis pin | 28 Tube sleeve | 43 Shaft screw locking wire |
| 13 Clevis cotter pin | 29 Tube nut | 44 Shaft screw |
| 14 Link return spring | 30 Tube | 45 Cross shaft sleeve bearing |
| 15 Hand lever connecting link | 31 Cylinder screw | 46 Right hand outer shaft lever |
| 16 Connecting link nut | | 47 Cylinder nut |

Figure 2-145. Pivot steering brake controls and linkage—exploded view.

2-205. Pivot Steering Brake Master Cylinders

(fig. 2-146)

NOTE

Removal and installation of left and right master cylinders is similar.

a. Removal.

NOTE

Place suitable container under master cylinder.

(1) Loosen nut (29) securing tube assembly (14 or 13) to reducer (30), and remove nut, reducer, elbow (32), and packing (33) from master cylinder (34). Discard packing.

(2) Remove three nuts (17) and screws (31) securing master cylinder (34) to pivot steer support (18), and remove master cylinder and bellows (16).

b. Inspection and Repair.

(1) Inspect master cylinders and filler caps for cracks, breaks, damaged threads, and deforma-

tion. Replace master cylinder that shows any of these defects.

(2) Inspect bellows for loss of resiliency, cracks, breaks, and cuts. Replace bellows that shows any of these defects.

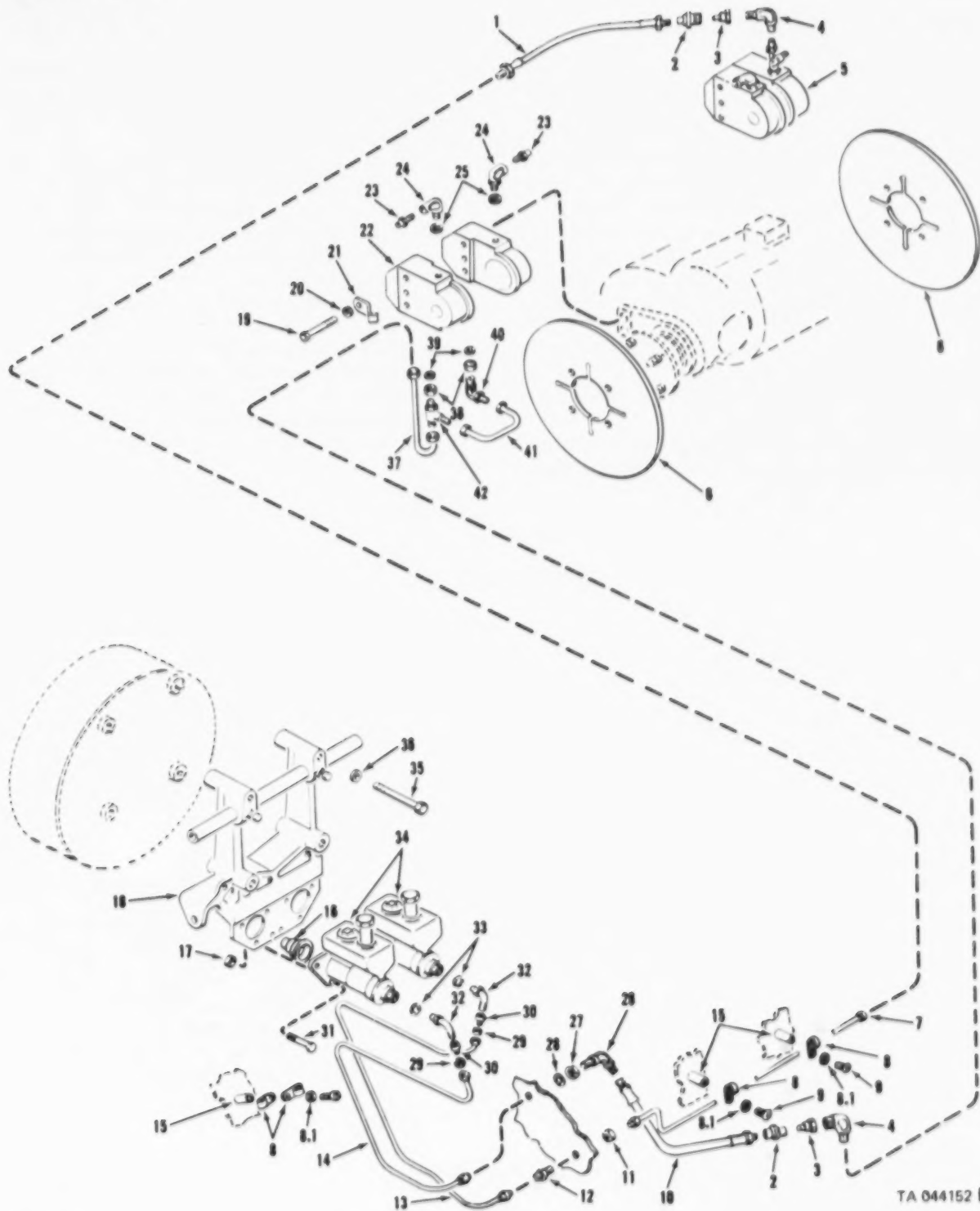
c. Installation.

(1) Install bellows (16) on master cylinder assembly (34), align shaft on master cylinder clevis (24, fig. 2-145) to master cylinder, align three mounting holes, and secure master cylinder to pivot steer support (18, fig. 2-146) with three screws (31) and nuts (17).

(2) Install elbow (32) and new packing (33) on rear of master cylinder (34).

(3) Connect tube assembly (14 or 13) to nut (29), secure nut to reducer (30), and secure reducer to elbow (32).

(4) Fill and bleed pivot steering hydraulic system (para 2-204).



TA 044152

Figure 2-146. Pivot steering brake hydraulic system - exploded view.

- 1 Hose assembly
- 2 Coupler body
- 3 Coupler nose
- 4 Hydraulic elbow
- 5 Brake assembly
- 6 Brake disk
- 7 Tube assembly
- 8 Brake line clamp
- 8.1 Washer
- 9 Clamp screw
- 10 Hose assembly
- 11 Union nut
- 12 Tubing union
- 13 Right tube assembly
- 14 Left tube assembly
- 15 Hull nut
- 16 Master cylinder bellows
- 17 Master cylinder nut
- 18 Pivot steer support
- 19 Brake screw
- 20 Brake washer
- 21 Tubing strap
- 22 Brake housing
- 23 Brake bleeder
- 24 Bleeder elbow
- 25 Bleeder elbow packing
- 26 Connecting elbow
- 27 Elbow nut
- 28 Tubing washer
- 29 Tubing nut
- 30 Tubing reducer
- 31 Master cylinder screw
- 32 Master cylinder elbow
- 33 Elbow packing
- 34 Master cylinder assembly
- 35 Support screw
- 36 Support washer
- 37 Brake tube assembly
- 38 Tee nut
- 39 Tee packing
- 40 Brake line elbow
- 41 Connecting tube assembly
- 42 Brake line tee

Figure 2-146. Pivot steering brake hydraulic system - exploded view - continued.

2-206. Pivot Steering Brake Hoses, Tubes, and Fittings

(fig. 2-146)

a. Removal.

NOTE

Place suitable container under bleeders of brake assemblies.

(1) Open bleeders (23), and operate hand levers (2 and 3, fig. 2-144) until hydraulic cylinder has been drained.

(2) Disconnect two coupler noses (3, fig. 2-146) from coupler body (2):

(a) Rotate sleeve of coupler assembly until slot aligns with pin.

(b) Pull back on sleeve to disconnect.

(3) Disconnect hose assembly (1) from tube assembly (7), disconnect hose assembly (10) from connecting elbow (26), and remove hose assemblies.

(4) Remove union nut (11) and tubing union (12) securing right tube assembly (13) to tube assembly (7).

(5) Loosen elbow nut (27), and remove elbow (26), elbow nut, and washer (28) from left tube assembly (14).

(6) Disconnect tube assemblies (13 and 14) from two reducers (30), remove three screws (9), three washers (8.1), and four clamps (8) securing three tube assemblies (14, 13, and 7) to three hull nuts (15), and remove tube assemblies.

(7) Remove two nuts (29), tubing reducers (30), elbows (32), and packings (33) from rear of two master cylinder assemblies (34). Discard packings.

(8) Remove two coupler noses (3) and elbows (4) from two brake tube assemblies (37).

(9) Remove two brake screws (19) and tubing straps (121) securing two brake tube assemblies (37) to two brake housings (22).

(10) Remove two brake tubes (37) and connecting tube assemblies (41) from two brake line tees (42) and two elbows (40), and remove tubes.

(11) Loosen four nuts (38), and remove two tees (42), two elbows (40), four nuts, and four packings (39) from brake assembly (5). Discard packings.

b. Inspection and Repair.

(1) Inspect tube assemblies for damaged threads, cracks, and excessive wear. Replace tube assemblies that show any of these defects.

(2) Inspect hose assemblies for damaged threads, cracks, and deterioration. Replace hose assemblies that show any of these defects.

(3) Inspect fittings and connections for damaged threads, distortion, and excessive wear. Replace parts that show any of these defects.

c. Installation.

NOTE

Clean external tapered threads, and apply a light coat of sealing compound MIL-S-7916 at assembly.

(1) Secure two elbows (40) and two tees (42) to brake housing with four nuts (38) and four new packings (39).

(2) Install two connecting tube assemblies (41) and two brake tube assemblies (37).

(3) Install two tubing straps (21) and screws (19). Tighten screws to 100 to 110 pound-feet torque.

CAUTION

Make certain straps (21) do not crimp tube assemblies (37).

(4) Install two elbows (4) and coupler noses (3).

(5) Install two new packings (33), master

(5) Install two new packings (33), master cylinder elbows (32), tubing reducers (30), and nuts (29) on rear of master cylinders (34).

(6) Connect left tube assembly (14) and right tube assembly (13) to two reducers (30).

(7) Secure tube assembly (7) to right tube assembly (13) with tubing union (12) and union nut (11).

(8) Secure right and left tube assemblies (13 and 14) and tube assembly (7) to hull nuts (15) with four clamps (8), three washers (8.1), and three screws (9).

(9) Install washer (28), nut (27), and connecting elbow (26) on bulkhead, and attach left tube assembly (14).

(10) Connect right hose assembly (1) to tube assembly (7) and left hose assembly (10) to elbow (26).

(11) Connect coupler noses (3) to right and left hose assemblies (1 and 10).

(12) Connect two coupler noses (3) to coupler bodies (2):

(a) Rotate sleeve of coupler until slot aligns with pin.

(b) Pull back on sleeve, connect coupler, and release sleeve.

(c) Rotate sleeve until slot is on opposite side from pin.

(13) Fill and bleed pivot steering hydraulic system (para 2-204).

2-207. Pivot Steering Brake Assembly

(fig. 2-146)

a. Removal.

(1) Disconnect coupler nose (3) from coupler body (2) at brake assembly (5).

(a) Rotate sleeve of coupler assembly until slot aligns with pin.

(b) Pull back on sleeve to disconnect coupler.

(2) Remove three screws (19), two washers (20), and tubing strap (21) securing brake assembly (5) to differential, and remove brake assembly.

(3) Remove tubes and fittings from brake assembly (para 2-206), and separate halves of brake housing (22).

b. Inspection and Repair.

(1) Inspect brake assemblies for cracks, chips, excessive wear, a damaged threads, and deformation. Replace brake assemblies that show any of these defects.

(2) Inspect all parts for damaged threads and deformation. Replace parts that show either of these defects.

c. Installation.

(1) Position two halves of brake housing (22) together, and install fittings and tubes on brake assembly (para 2-206).

(2) Position brake assembly (5) over brake disk (6) and on differential, and secure with two washers (20), one tubing strap (21), and three screws (19). Tighten screws to 100 to 110 pound-feet torque.

CAUTION

Make certain strap (21) does not crimp tube assembly (37).

(3) Connect coupler nose (3) to coupler body (2) at brake assembly (5):

(a) Rotate sleeve of coupler body until slot aligns with pin.

(b) Pull back on sleeve, connect coupler assembly, and release sleeve.

(c) Rotate sleeve until slot is 180 degrees away from pin.

NOTE

Position elbow (4) on tube assembly (37) to provide clearance for brake bleeding.

(4) Fill and bleed pivot steering hydraulic system (para 2-204).

2-208. Pivot Steering Brake Disk

(fig. 2-138)

a. Removal.

(1) Remove pivot steering brake assembly (para 2-207).

(2) Remove right final drive propeller shaft (para 2-172 or left final drive universal joint plate (para 2-173), as applicable.

(3) Remove four nuts securing disk and adapter to differential output shaft, and remove disk and adapter.

b. *Inspection and Repair.* Inspect disk and adapter to cracks, chips, excessive wear, and deformation. Replace disk or adapter that shows any of these defects.

c. Installation.

(1) Secure disk and adapter to differential output shaft with four nuts. Tighten nuts to 75 to 80 pound-feet torque.

(2) Install right final drive propeller shaft (para 2-172) or left final drive universal joint plate (para 2-173), as applicable.

(3) Install pivot steering brake assembly (para 2-207).

(4) Fill and bleed pivot steering brake hydraulic system (para 2-204).

2-209. Pivot Steering Brake Lining

(fig. 2-147)

NOTE

Removal and installation of the left pivot steering brake assembly lining is similar to removal and installation of the right pivot steering brake assembly lining.

a. Removal.

(1) Remove pivot steering brake assembly (para 2-207).

(2) Remove two rivets and two clips, if installed, and remove brake lining from piston. Some brake linings may not have clips and rivets installed.

b. Inspection and Repair. Inspect brake lining for chipped, cracked, and excessively worn condition. New brake lining has grooves $\frac{1}{4}$ inch deep. Replace lining worn to groove depth, or that shows either of the other defects.

*c. Installation.***NOTE**

One brake assembly parts kit is required for each brake assembly. Discard two clips and two rivets supplied with each kit.

(1) Press self-adjusting piston and new brake lining into housing until flush with rear of housing.

(2) Install pivot steering brake assembly (para 2-207).

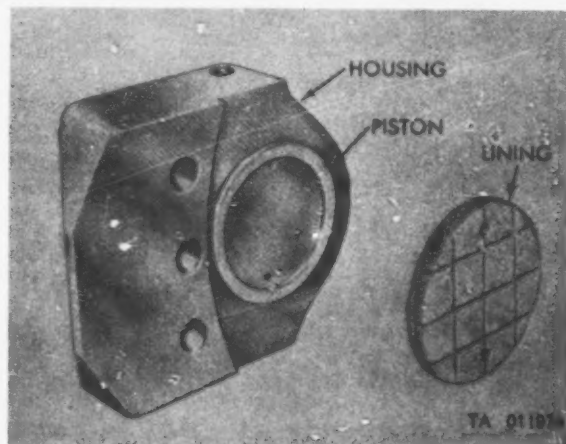


Figure 2-147. Pivot steering brake lining—exploded view.

2-210. Hand Throttle Control (fig. 2-148)

*a. Adjustment.***NOTE**

With accelerator pedal in full throttle position, make certain link pin (6) does not hit control cable housing. If link pin hits housing, reposition control cable (3) in clamp (18).

(1) Loosen setscrew (5) in retainer collar (4) securing hand throttle control cable (3) to link pin (6).

(2) Push hand throttle control cable (3) in flush against stop.

(3) Place accelerator pedal in released position against heel stop.

(4) Position collar (4) on control cable (3) at link pin (6) so that collar will not interfere with accelerator pedal in idle position, and secure setscrew (5).

(5) Bend end of cable core to secure collar.

b. Removal.

(1) Remove three screws (13), washers (14), and clamps (15) securing hand throttle control cable (3) to three hull nuts (16).

(2) Loosen setscrew (5) securing hand throttle control cable (3) to retainer collar (4), and remove collar and setscrew.

(3) Loosen two screws (9), nuts (19), and clamp (18) securing control cable (3) to adapter (12), and remove cable from adapter.

(4) Loosen nut (1) and washer (2) securing hand throttle control cable (3) to instrument panel, and remove control cable from instrument panel.

(5) Pull cable (3) through grommet (17), and remove cable from carrier. Remove and discard grommet.

(6) Remove nut (10) and washer (11) securing adapter (12) and clamp (18) to floor plate, and remove adapter and clamp.

(7) Remove two screws (9) and nuts (19) securing clamp (18) to adapter (12), and separate clamp from adapter.

(8) Remove cotter pin (8) and washer (7) securing link pin (6) to accelerator pedal, and remove link pin. Discard cotter pin.

c. Inspection and Repair.

(1) Inspect hand throttle control cable housing for loss of resiliency, cracks, breaks, and cuts. Replace cable housing that shows any of these defects.

(2) Inspect hand throttle control cable for breaks and excessive wear. Replace cable that shows either of these defects.

(3) Inspect threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

d. Installation.

(1) Position link pin (6) to accelerator pedal, and secure with washer (7) and new cotter pin (8).

(2) Position clamp (18) on adapter (12), and secure loosely with two screws (9) and nuts (19).

(3) Position adapter (12) with clamp (18) through floor plate, and secure with washer (11) and nut (10).

(4) Position hand throttle control cable (3) on instrument panel, and secure with nut (1) and washer (2).

(5) Install new grommet (17) in bulkhead, feed cable (3) through grommet and adapter (12), and secure to adapter with clamp (18), two screws (9), and nuts (19).

(6) Feed cable (3) through link pin (6), install retainer collar (4), and secure collar with setscrew (5).

(7) Position control cable (3) to three hull nuts (16), and secure with three clamps (15), washers (14), and screws (13).

(8) Adjust control (a above).

Legend to fig. 2-148.

- 1 Hand throttle control nut
- 2 Hand throttle control washer

- 3 Hand throttle control cable assembly
- 4 Retainer collar
- 5 Setscrew
- 6 Link pin
- 7 Spacer washer
- 8 Cotter pin
- 9 Accelerator cable clamp screw
- 10 Adapter nut
- 11 Adapter washer
- 12 Accelerator control adapter
- 13 Control cable clamp screw
- 14 Control cable clamp washer
- 15 Control cable clamp
- 16 Hull nut
- 17 Throttle control grommet
- 18 Accelerator cable clamp
- 19 Accelerator cable clamp nut

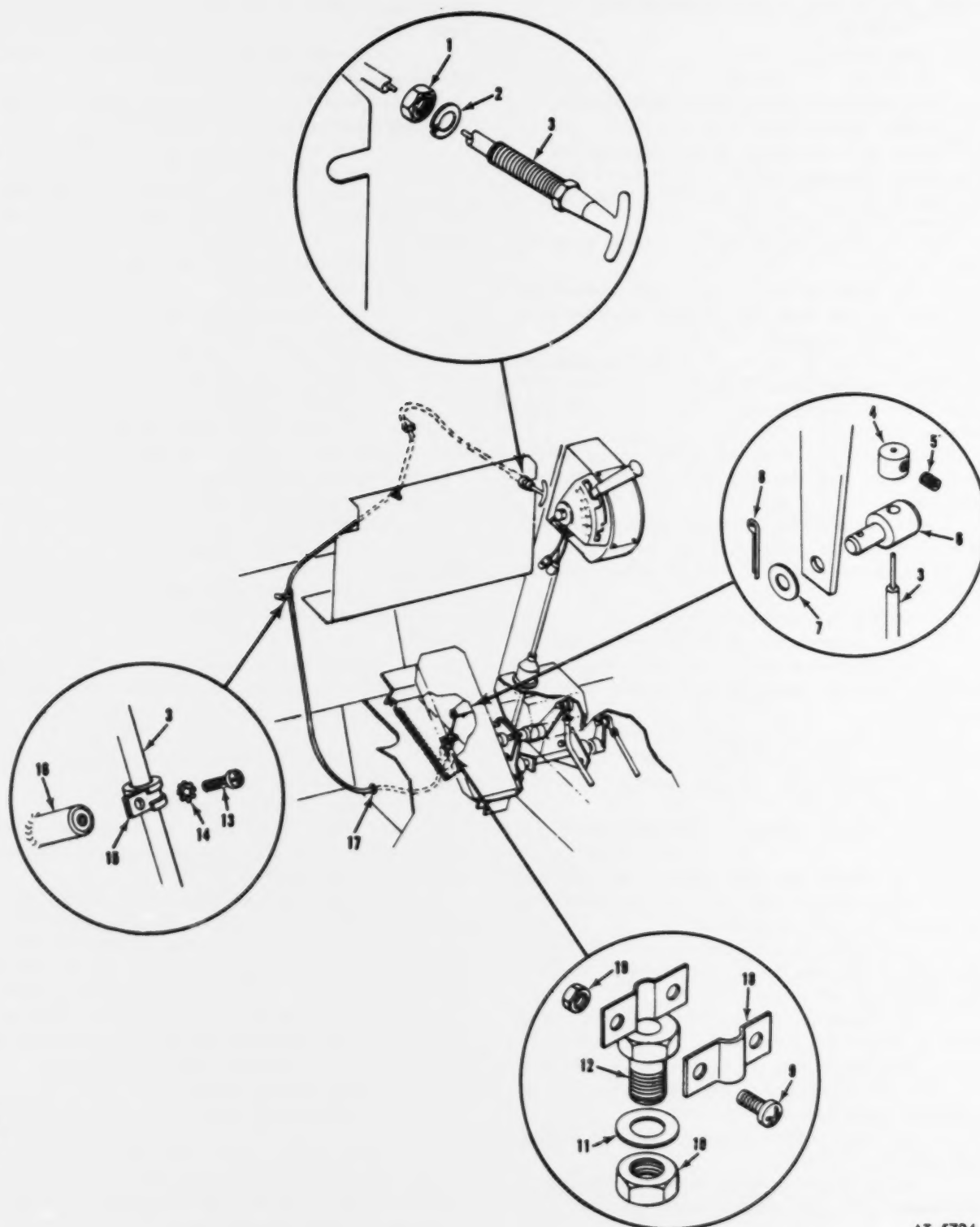


Figure 2-148. Hand throttle, accelerator pedal, and range selector controls.

AT 5704

2-211. Accelerator Pedal Controls and Linkage

a. Adjustment (fig. 2-149).

NOTE

Before throttle and governor throttle arm linkage adjustments can be made, the engine governor must be set properly for engine idle speed (550 to 600 rpm) and engine no-load speed by direct support maintenance personnel.

(1) Adjust governor throttle arm on governor (fig. 2-150).

(a) Remove screw and nut connecting governor throttle arm and transfer throttle link, and remove transfer throttle link.

(b) Remove two screws securing gage on governor, position gage in adjusting position (turn gage over, and end-for-end), and secure with two screws.

(c) Loosen clamping screw on governor throttle arm, and position shaft at full throttle position.

(d) Aline throttle arm and gage, secure with screw (removed in (a) above), and rotate governor shaft clockwise against full throttle stop in governor.

(e) Tighten clamping screw.

(f) Remove screw (installed in (d) above).

(g) Remove two screws securing gage, place gage in operating position, and secure with two screws.

(h) Aline governor throttle arm and transfer link, and secure with screw and nut.

(2) Adjust pedal to full throttle and idle position (fig. 2-149).

(a) Adjust governor throttle arm ((1) above).

(b) Loosen toe stop locknut on toe stop screw, and turn toe stop screw in to allow free movement of accelerator pedal.

(c) Loosen detent stop locknut on detent stop screw, and turn detent stop screw in to allow free movement of accelerator pedal.

(d) Remove throttle control link at cross shaft bellcrank by removing screw and nut.

(e) Loosen nut on accelerator pedal link.

(f) Remove screw and nut securing accelerator pedal link at cross shaft.

(g) Hold engine governor throttle arm at full throttle position.

(h) Hold cross shaft throttle bellcrank in maximum forward transmission throttle arm position.

(i) Aline hole in throttle control link and

cross shaft bellcrank so screw will pass through both freely.

(j) Shorten throttle control link by 11 turns of rod end bearing.

(k) Secure throttle control link to cross shaft bellcrank with screw and nut.

(l) Position engine governor throttle arm at idle and accelerator pedal against heel stop.

(m) Aline holes in accelerator pedal link and cross shaft so screw will pass through both freely.

(n) Lengthen accelerator pedal link one full turn of rod end bearing.

(o) Secure accelerator pedal link to cross shaft with screw and nut.

(3) Adjust pedal stops (fig. 2-149).

(a) Adjust detent stop screw:

1. Loosen locknut.

2. Adjust detent stop screw so plunger will contact screw at full throttle position with transfer throttle link spring compressed 1/64 to 3/64 inch. Tighten locknut on detent stop screw.

(b) Adjust toe stop screw:

1. Disconnect throttle control link at cross shaft bellcrank.

2. Depress accelerator pedal until transmission throttle valve arm is in full up travel position.

3. Adjust toe stop screw to 1/16 inch gap between screw and accelerator pedal when transmission throttle valve arm is in full travel position.

4. Connect throttle control link at inner cross shaft bellcrank.

(4) Check controls operation:

(a) Operate carrier until engine and transmission are at normal operating temperatures (TM 9-1450-585-10).

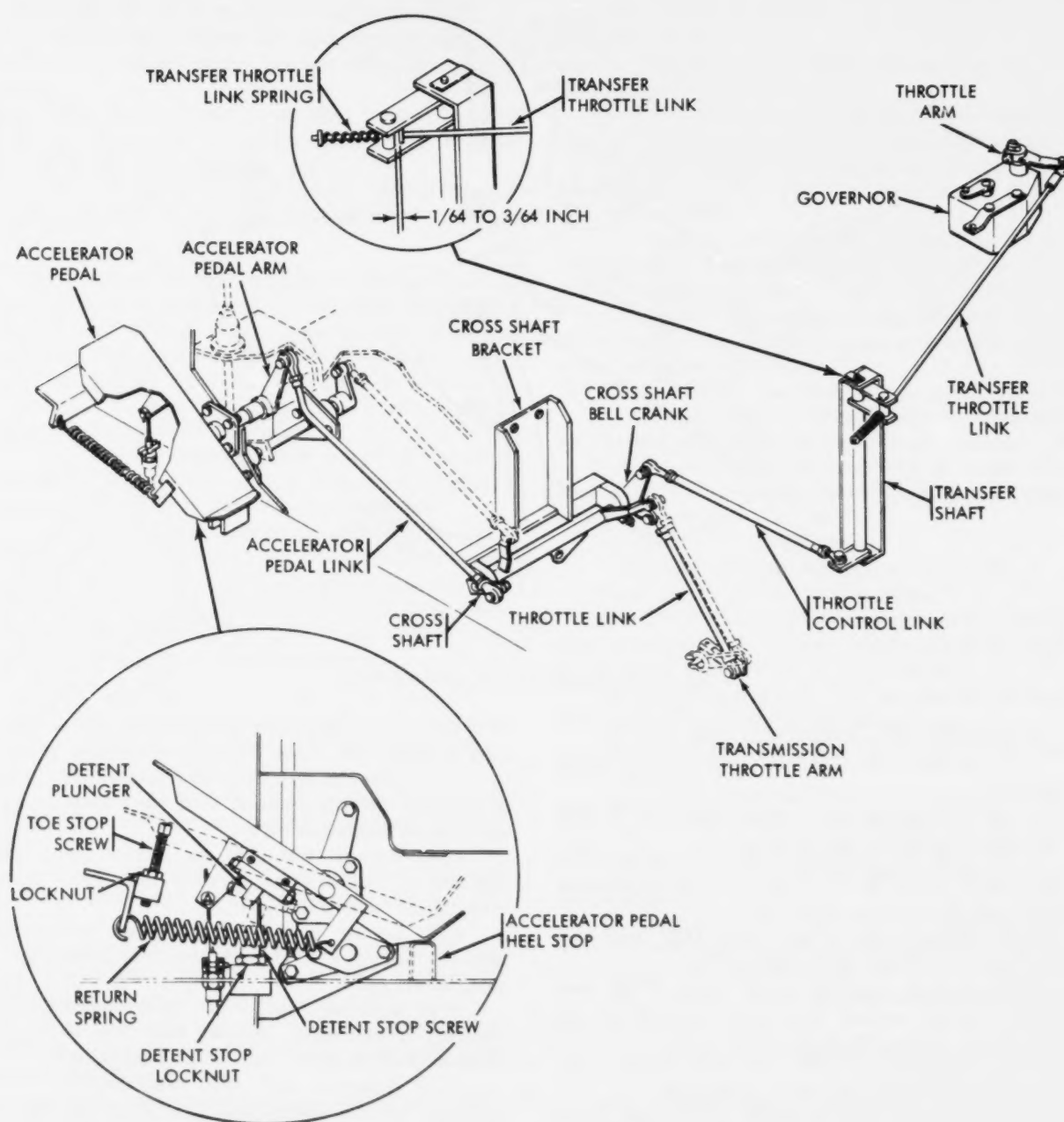
(b) After warmup operation, check transmission shift points 1-3 or 2-3 ranges at full throttle. Shift from second lockup to third converter should occur at engine speed of 2,700 to 2,800 rpm. To decrease engine rpm, shorten throttle control link. To increase engine rpm, lengthen throttle control link. If throttle control link is readjusted, repeat adjustments in (3) above.

(5) Adjust detent plunger (fig. 2-151):

(a) Loosen two locknuts (5) on detent block (43).

(b) Turn two screws (6) clockwise to increase pressure or counterclockwise to decrease pressure until a force of 35 to 40 pounds is required to depress detent plunger (42).

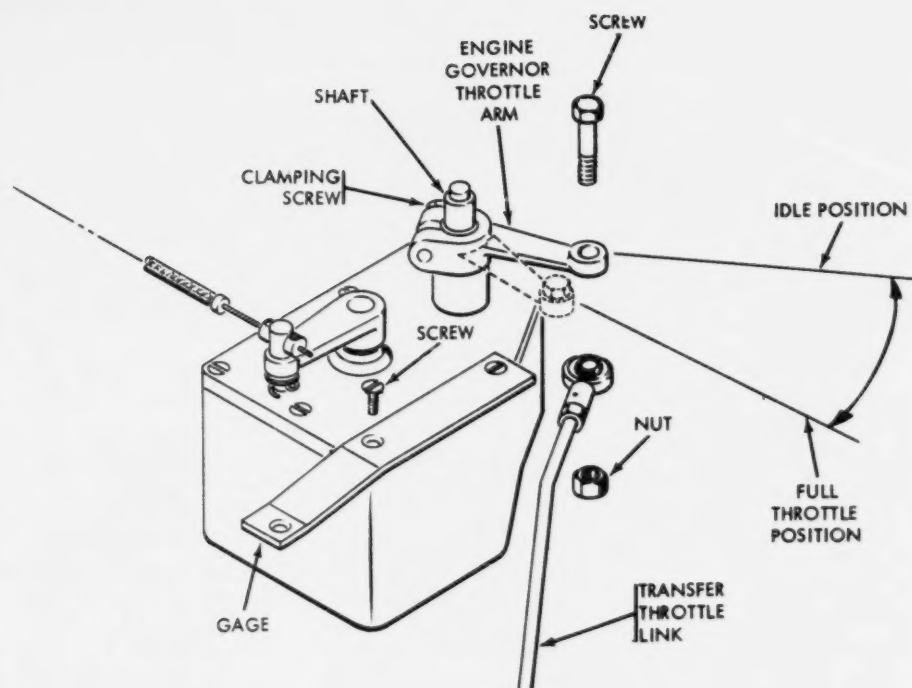
(c) Tighten locknuts (5).



NOTE: ACCELERATOR PEDAL AGAINST HEEL STOP IS IN IDLE POSITION

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Figure 2-149. Accelerator pedal controls, linkage, and adjustments.



AT 3870

Figure 2-150. Engine throttle control linkage.

b. Removal and Disassembly (fig. 2-151).

- (1) Remove hand throttle control cable (para 2-210).
- (2) Remove return spring (41) from toe stop (1) and accelerator pedal (9).
- (3) Remove two nuts (18) and screws (15), and remove pedal link (19) from pedal control arm (16) and inner cross shaft (37).
- (4) Remove three jam nuts (38) and two bearings (17) from pedal link (19).
- (5) Loosen nut (46) and screw (14), and remove pedal control arm (16), key (47), and accelerator pedal (9) from guide (12).
- (6) Remove four nuts (13) and screws (10), and remove guide (12) from bulkhead.
- (7) Remove two bearings (11) from guide (12).
- (8) Remove toe stop screw (3) and adjusting nut (2) from toe stop (1).
- (9) Remove two nuts (45) and screws (4), and remove detent block (43) from accelerator pedal (9).
- (10) Remove two locknuts (5) and adjusting screws (6), and remove two detent springs (7) and balls (8) from detent block (43).
- (11) Remove detent plunger (42) and spring (44) from block (43).

- (12) Remove detent plunger stop screw (40) and locknut (39) from driver's right floor plate.

- (13) Remove nut (36) and screw (57), and disconnect throttle control link (54) from inner cross shaft bellcrank (59).

- (14) Remove nut (35) and screw (56), and disconnect transmission throttle link (33) from cross shaft bellcrank (59).

- (15) Loosen nut (34) and screw (60), and remove bellcrank (59) and key (62) from inner cross shaft (37).

- (16) Remove nut (30) and screw (32) securing transmission throttle link (33) to transmission throttle arm (31), and remove link.

- (17) Remove nut (29) and screw (53) securing throttle control link (54) to transfer shaft (27), and remove link.

- (18) Remove jam nut (55) and bearing (58) from throttle control link (54).

- (19) Remove cotter pin (26) and washer (25), and remove spring (24) from transfer throttle link (21). Discard cotter pin.

- (20) Remove nut (49) and screw (20), and disconnect transfer throttle link (21) at engine governor.

- (21) Remove cotter pin (23) and pin (22)

securing transfer throttle link (21) to transfer shaft (27), and remove link. Discard cotter pin.

(22) Remove screw (48) and nut (51) securing pivot rod (50) to control bracket (65), and remove rod.

(23) Remove two nuts (66), washers (65.1), screws (52.1), and one screw (52). Remove control bracket (65) from power plant.

(24) Pull two bearings (28) from control bracket (65), and remove transfer shaft (27).

c. Inspection and Repair.

(1) Inspect springs for loss of tension, cracks, and broken tangs. Springs should not be noticeable longer or shorter than new springs. Replace springs that show any of these defects.

(2) Inspect all threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

(3) Inspect bearings for rough or uneven rotation, wear, grooves, and scratches. Replace bearings that show any of these defects.

(4) Inspect links, shafts, brackets, pins, keys, arms, and pedal for excessive wear at connection points, distortion, cracks, nicks, grooves, scratches, and burs. Remove shallow scratches and burs. Replace parts that show any of these defects, or if scratches or burs cannot be removed.

d. Assembly and Installation (fig. 2-151).

(1) Position control bracket (65) to power plant, and secure with two screws (52.1), washers (65.1), nuts (66), and one screw (52).

(2) Install two bearings (28) in transfer shaft (27), and position transfer shaft in control bracket (65).

(3) Insert pivot rod (50) through bearings and transfer shaft, and secure with screw (48) and nut (51).

(4) Insert pin (22) into transfer shaft (27) and transfer throttle link (21) into pin (22), and secure pin (22) in link with new cotter pin (23).

(5) Install spring (24) and washer (25) on transfer throttle link (21), and secure with new cotter pin (26).

(6) Position transfer throttle link (21) to engine governor, and secure with screw (20) and nut (49).

(7) Position cross shaft bellcrank (59) and key (62) on inner cross shaft (37), and secure with screw (60) and nut (34).

(8) Install jam nut (55) and bearing (58) on throttle control link (54).

(9) Position throttle control link (54) to transfer shaft (27), and secure with screw (53) and nut (29).

(10) Position throttle control link (54) to inner cross shaft bellcrank (59), and secure with screw (57) and nut (36).

(11) Position transmission throttle link (33) to transmission throttle arm (31), and secure with screw (32) and nut (30).

(12) Position transmission throttle link (33) to inner cross shaft bellcrank (59), and secure with screw (56) and nut (35).

(13) Install two bearings (11) in guide (12).

(14) Position pedal shaft guide (12) to bulkhead, and secure with four screws (10) and nuts (13).

(15) Install detent plunger (42) in block (43), and secure with two balls (8), springs (7), adjusting screws (6), and locknuts (5).

NOTE

Lubricate detent plunger at assembly with grease (GAA) MIL-G-10924.

(16) Install detent plunger spring (44) in block (43), position block to accelerator pedal (9), and secure with two screws (4) and nuts (45).

(17) Install detent plunger stop screw (40) and locknut (39) on driver's right floor plate.

(18) Install toe stop screw (3) and adjusting nut (2) in toe stop (1).

(19) Insert accelerator pedal (9) through guide (12), in tall pedal control arm (16) and key (47), and secure arm to pedal with screw (14) and nut (46).

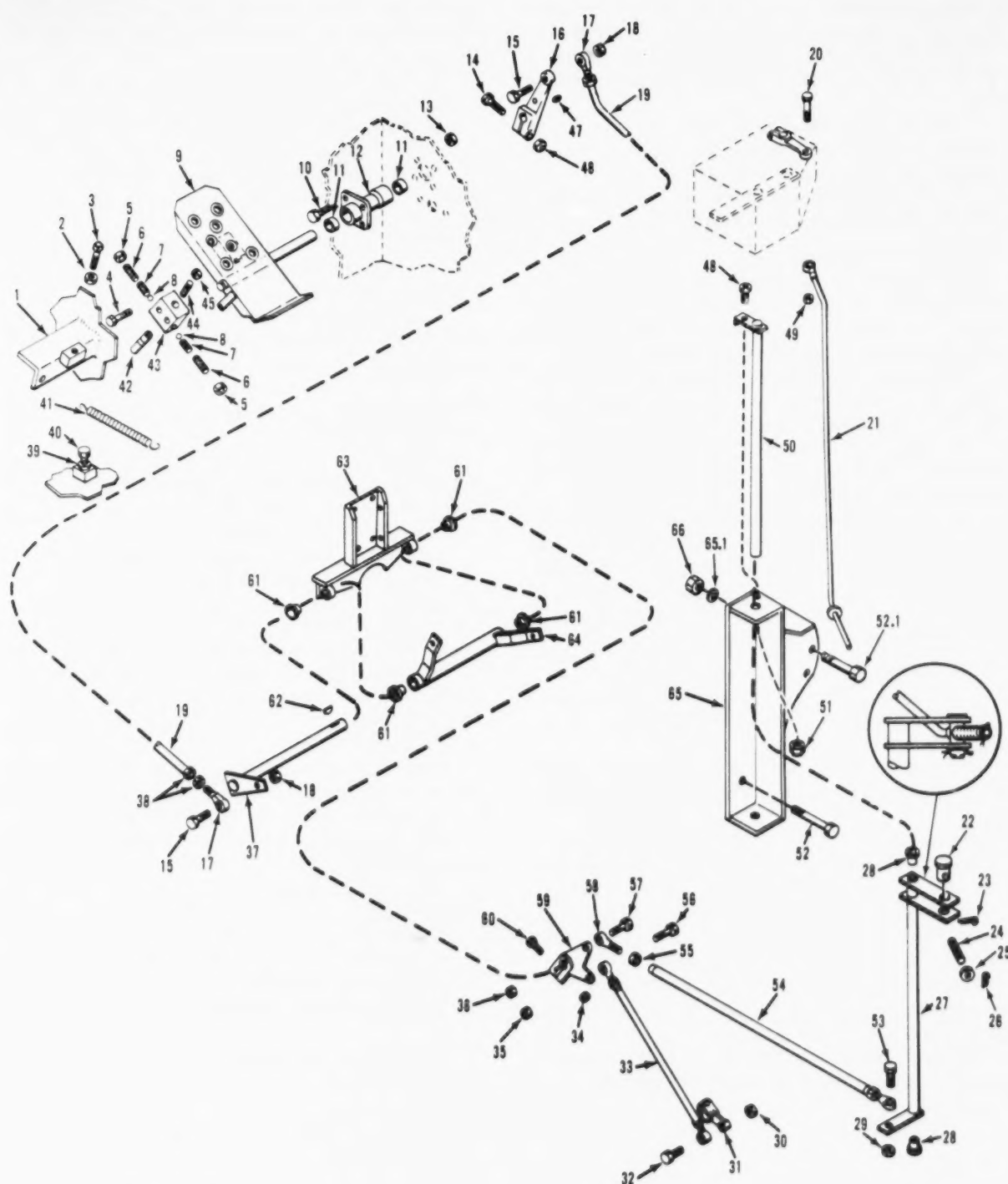
(20) Install jam nut (38) and bearing (17) on pedal link (19).

(21) Position pedal link (19) to pedal control arm (16) and inner cross shaft (37), and secure with two screws (15) and nuts (18).

(22) Connect return spring (41) to top stop (1) and accelerator pedal (9).

(23) Install hand throttle control cable (para 2-210).

(24) Adjust accelerator pedal controls and linkage (a above).



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Figure 2-151. Accelerator pedal controls and linkage.

Legend to fig. 2-151.

- 1 Accelerator pedal toe stop
- 2 Toe stop adjusting nut
- 3 Toe stop screw
- 4 Detent block screw
- 5 Detent locknut
- 6 Detent adjusting screw
- 7 Detent block spring
- 8 Detent block ball
- 9 Accelerator pedal
- 10 Pedal shaft guide screw
- 11 Guide bearing
- 12 Pedal shaft guide
- 13 Guide nut
- 14 Pedal control arm screw
- 15 Pedal link screw
- 16 Pedal control arm
- 17 Pedal link end bearing
- 18 Pedal link nut
- 19 Pedal link
- 20 Governor throttle arm screw
- 21 Transfer throttle link
- 22 Transfer shaft pin
- 23 Transfer shaft cotter pin
- 24 Transfer throttle link spring
- 25 Transfer throttle link washer
- 26 Transfer throttle link cotter pin
- 27 Transfer shaft
- 28 Transfer shaft bearing
- 29 Transfer shaft nut
- 30 Transmission throttle arm nut
- 31 Transmission throttle arm
- 32 Transmission throttle arm screw
- 33 Transmission throttle link
- 34 Cross shaft bellcrank nut
- 35 Transmission throttle link nut
- 36 Control link nut
- 37 Inner cross shaft
- 38 Pedal link jam nut
- 39 Detent stop screw locknut
- 40 Detent plunger stop screw
- 41 Pedal return spring
- 42 Detent plunger
- 43 Detent block
- 44 Detent plunger spring
- 45 Detent block nut
- 46 Pedal control arm nut
- 47 Pedal control arm key
- 48 Pivot rod screw
- 49 Governor throttle arm nut
- 50 Control bracket pivot rod
- 51 Pivot rod nut
- 52 Control bracket screw
- 52.1 Control bracket screw
- 53 Transfer shaft screw
- 54 Throttle control link
- 55 Control link jam nut
- 56 Transmission throttle link screw
- 57 Control link screw
- 58 Throttle control link end bearing
- 59 Inner cross shaft bellcrank
- 60 Cross shaft bellcrank screw
- 61 Cross shaft bushing
- 62 Inner cross shaft bellcrank key
- 63 Cross shaft bracket
- 64 Outer cross shaft
- 65 Control bracket
- 65.1 Lock washer
- 66 Control bracket nut

Figure 2-151. Accelerator pedal controls and linkage - continued.

2-212. Fuel Cutoff Control

(fig. 2-152)

a. Adjustment.

- (1) Loosen two setscrews (18) in two collars (17)

securing fuel cutoff control (1) to engine governor link pin (19).

- (2) Pull fuel cutoff control (1) to full out (engine off) position.

(3) Rotate engine governor link (14) clockwise against stop in engine governor housing.

- (4) Position two collars (17) against engine governor link pin (19), and secure with two setscrews (18).

b. Removal.

- (1) Remove two setscrews (18) from two collars (17) securing fuel cutoff control (1) to engine governor link pin (19), and remove control and collars.

- (2) Remove two screws (8) and nuts (13) securing adapter clamp (9) to adapter (12), and remove clamp.

- (3) Remove six screws (4), washers (6), and clamps (5) securing fuel cutoff control (1) to six hull nuts (7).

- (4) Remove locknut (3) and washer (2) securing fuel cutoff control (1) to instrument panel, and remove control from instrument panel.

- (5) Remove strap (10), pull control (1) through adapter (12) and grommet (20), and remove control from carrier. Remove and discard grommet.

- (6) Remove nut (11) securing adapter (12) to regulator bracket, and remove adapter.

- (7) Remove cotter pin (15) and washer (16) securing link pin (19) to engine governor link (14), and remove link pin. Discard cotter pin.

c. Inspection and Repair.

- (1) Inspect fuel cutoff control cover for loss of resiliency, cracks, breaks, and cuts. Replace fuel cutoff control if cover shows any of these defects.

- (2) Inspect fuel cutoff control cable for breaks and excessive wear. Replace fuel cutoff control if cable shows either of these defects.

- (3) Inspect threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

d. Installation.

- (1) Install link pin (19) in engine governor link (14), and secure with washer (16) and new cotter pin (15).

- (2) Install adapter (12) in regulator bracket, and secure with nut (11).

- (3) Install new grommet (20) in bulkhead, and feed fuel cutoff control (1) through grommet (20) and adapter (12).

- (4) Position fuel cutoff control (1) to instrument panel, and secure with washer (2) and locknut (3).

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(5) Secure fuel cutoff control (1) to six hull nuts (7), and secure with six clamps (5), washers (6), and screws (4).

(6) Position control (1) in adapter (12), and secure with adapter clamp (9), two screws (8), and nuts (13).

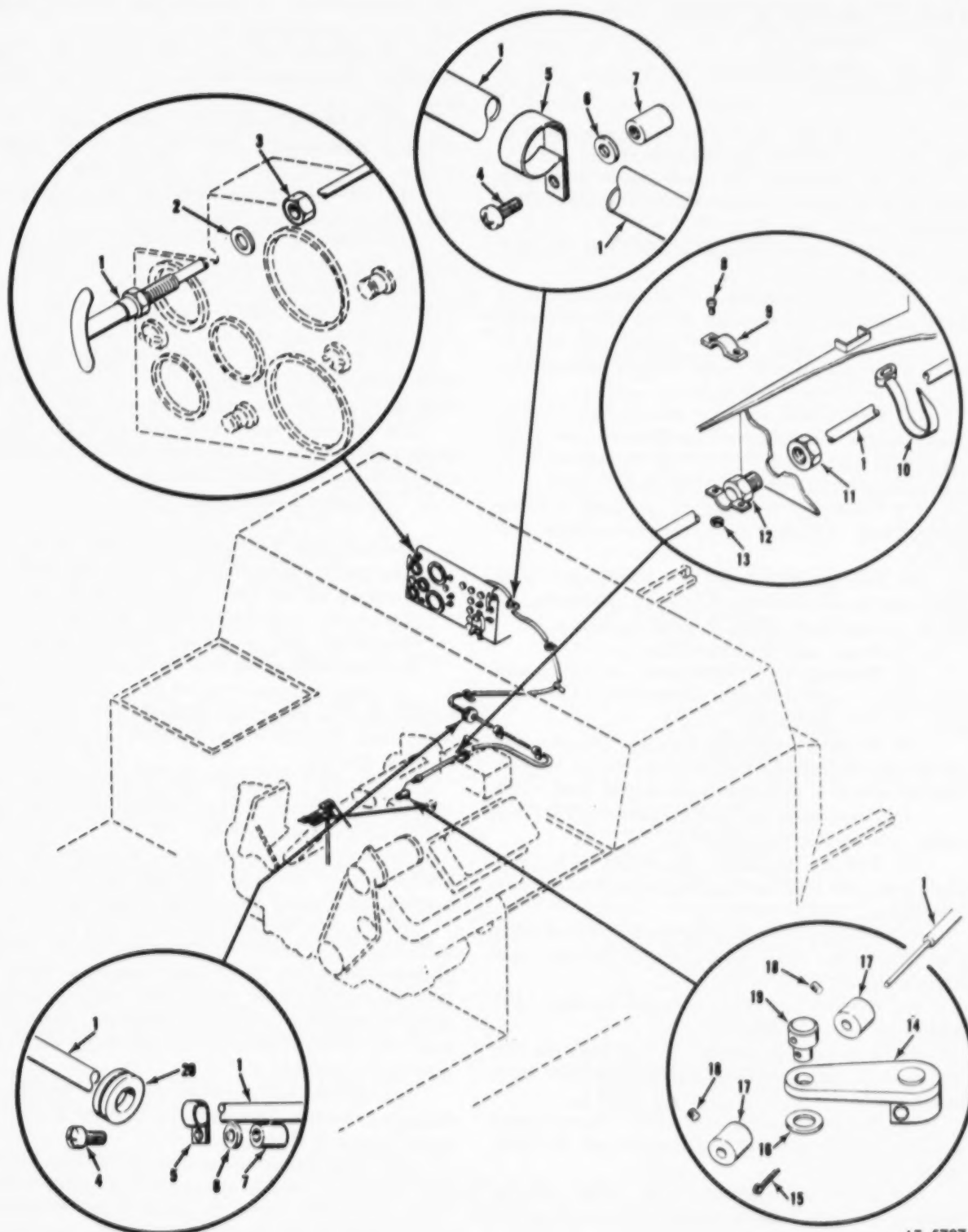
(7) Install control (1) through two collars (17) and engine governor link pin (19) on engine governor link (14), and secure collars with two setscrews (18).

(8) Adjust fuel cutoff control (a above).

Legend to fig. 2-152.

- 1 Fuel cutoff control assembly
- 2 Lock washer
- 3 Locknut
- 4 Control cable clamp screw
- 5 Control cable clamp
- 6 Control cable clamp washer
- 7 Hull nut
- 8 Adapter clamp screw
- 9 Adapter clamp
- 10 Retainer strap
- 11 Adapter nut
- 12 Control cable adapter
- 13 Adapter clamp nut
- 14 Engine governor link
- 15 Cotter pin
- 16 Link pin washer
- 17 Control cable collar
- 18 Collar setscrew
- 19 Link pin
- 20 Control cable grommet

Figure 2-152. Fuel cutoff control - continued.



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Figure 2-152. Fuel cutoff control.

2-213. Transmission Range Selector and Linkage (fig. 2-153)

a. Adjustment.

- (1) Loosen jam nut (10) at range selector arm end of range selector control link (11).
- (2) Remove nut (9) and screw (6), and remove range selector control link (11) from range selector control arm (7).
- (3) Place range selector control rod (5) in 1 drive position.
- (4) Place transmission shift arm (25) in 1 drive position by depressing arm to end of travel.
- (5) Adjust range selector control link (11) to allow a free pin fit with range selector control arm (7).
- (6) Hold range selector control link (11) to range selector control arm (7) with screw, and place range selector control rod (5) in R position with transmission shift arm (25) up to end of travel.
- (7) Check for free pin fit at range selector control link (11) and range selector control arm (7).
- (8) Readjust range selector control link (11) or gear selector link (32) until free pin is obtained at all of transmission range selector positions.

b. Removal and Disassembly.

- (1) Remove screw (34) and nut (38), and disconnect range selector control link (11) from gear selector shaft (39).
- (2) Remove screw (6) and nut (9) securing range selector control link (11) to range selector control arm (7), and remove link and boot (12).
- (3) Remove jam nut (10) and bearing (8) from range selector control link (11).
- (4) Remove nut (33) and screw (13), and disconnect gear selector link (32) from gear selector arm (14).
- (5) Remove nut (42) and screw (28) securing gear selector link (32) to outer cross shaft (44), and remove link.
- (6) Remove jam nut (31) and bearing (27) from gear selector link (32).
- (7) Remove two screws (4) and washers (3), and remove range selector control assembly from bulkhead.
- (8) Remove two pins (35), and remove range selector control arm (7) and control rod (5) from shaft (1).
- (9) Draw out shaft (1) from range selector housing (2), and remove spring (36) and bearing (37).
- (10) Remove pin (15) from gear selector arm (14), and remove arm from gear selector shaft (39).
- (11) Remove four nuts (40), screws (16), and

two bearings (17) and remove gear selector shaft (39) from bulkhead mount.

(12) Remove nut (43) and screw (22), and disconnect transmission shift link (23) from outer cross shaft (44).

(13) Remove nut (24) and screw (26) securing transmission shift link (23) to transmission shift arm (25), and remove link.

(14) Remove differential oil filter (para 2-163) from cross shaft bracket.

(15) Remove accelerator pedal linkage (para 2-211) from inner cross shaft and bellcrank.

(16) Remove two screws (46) and key washers (45), and remove cross shaft bracket (41) from transmission. Discard key washers.

(17) Loosen screw (20) and nut (18) securing inner cross shaft bellcrank (19) to inner cross shaft (30), and remove bellcrank and key (29).

(18) Remove inner cross shaft (30) and outer cross shaft (44) from cross shaft bracket (41), and remove four cross shaft bushings (21).

c. Inspection and Repair.

NOTE

Bearings may be replaced on connecting links that are not pinned. If connecting link is pinned on one end, tube and bearing on pinned end must be replaced as a unit. If connecting link is pinned on both ends, complete connecting link must be replaced.

(1) Inspect range selector prior to removal for cracks, breaks, distortion, chipped control rod, and worn shaft. Replace range selector that shows any of these defects.

(2) Inspect bearings for rough or uneven rotation and excessive wear. Replace bearings that show any of these defects.

(3) Inspect bushing type bearings for excessive wear, grooves, and scratches. Replace bearings that show any of these defects.

(4) Inspect links, shafts, brackets, pins, keys, arms, and cross shaft for distortion, cracks, nicks, grooves, scratches, burs, and excessive wear at bearing surfaces and connection points. Remove shallow scratches and burs. Replace parts that show any of these defects, or if scratches and burs cannot be removed.

(5) Inspect all threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

(6) Inspect spring for loss of tension, broken condition, free length, and maximum solid height. Free length should be $\frac{3}{8}$ to $\frac{1}{2}$ inch. Maximum solid height should be $1\frac{1}{32}$ inch. Replace spring that shows any of these defects.

d. Assembly and Installation.

- (1) Install four cross shaft bushings (21),

inner cross shaft (30), and outer cross shaft (44) to cross shaft bracket (41).

(2) Position inner cross shaft bellcrank (19) and key (29) on inner cross shaft (30), and secure with screw (20) and nut (18).

(3) Position cross shaft bracket (41) to transmission, and secure with two screws (46) and new key washers (45).

(4) Install accelerator pedal linkage (para 2-211) to inner cross shaft and bellcrank.

(5) Install differential oil filter (para 2-163) to cross shaft bracket.

(6) Position transmission shift link (23) to transmission shift arm (25), and secure with screw (26) and nut (24).

(7) Position transmission shift link (23) to outer cross shaft (44), and secure with screw (22) and nut (43).

(8) Insert gear selector shaft (39) into bulkhead mounting hole.

(9) Position two bearings (17) to gear selector shaft (39) and bulkhead mounting holes, and secure with four screws (16) and nuts (40).

(10) Position gear selector arm (14) to gear selector shaft (39), and install pin (15).

(11) Install jam nut (31) and bearing (27) on gear selector link (32).

(12) Position gear selector link (32) to outer cross shaft (44), and secure with screw (28) and nut (42).

(13) Position gear selector link (32) to gear selector arm (14), and secure with screw (13) and nut (33).

(14) Position range selector control rod (5), bearing (37), and spring (36) in range selector housing (2), insert shaft (1), and secure with pin (35).

(15) Position range selector control arm (7) to shaft, and secure with pin (35).

(16) Position range selector control assembly to bulkhead, and secure with two washers (3) and screws (4).

(17) Install boot (12) on range selector control link (11), position link to range selector control arm (7), and secure with screw (6) and nut (9).

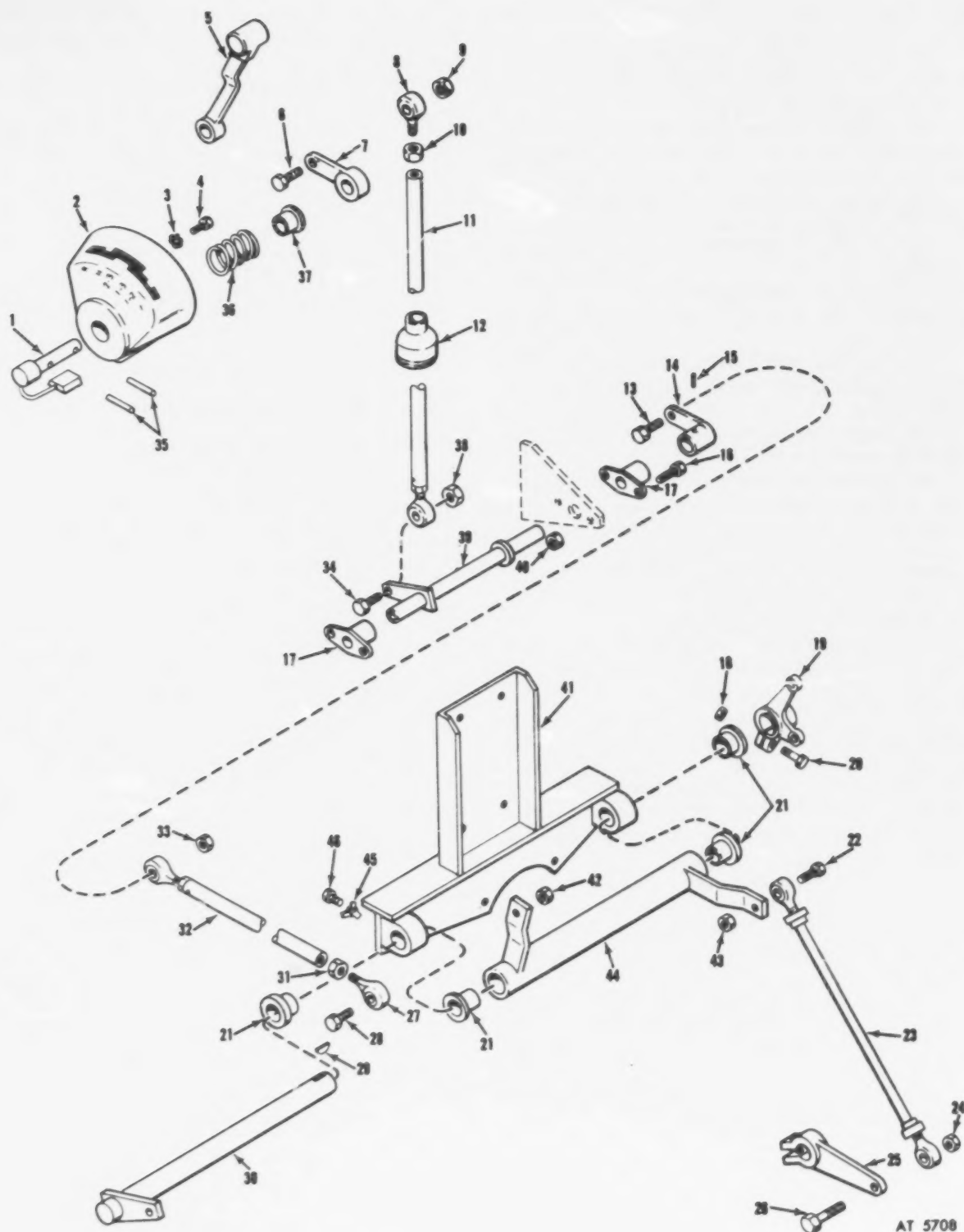
(18) Install jam nut (10) and bearing (8) on range selector control link (11).

(19) Position range selector control link (11) to gear selector shaft (39), and secure with screw (34) and nut (38).

(20) Adjust range selector control and linkage (a above).

LEGEND to fig. 2-153

- 1 Range selector control shaft
- 2 Range selector control housing
- 3 Housing washer
- 4 Housing screw
- 5 Range selector control rod
- 6 Control arm screw
- 7 Range selector control arm
- 8 Range selector control link end bearing
- 9 Control arm nut
- 10 Range selector control link jam nut
- 11 Range selector control link boot
- 12 Range selector control link
- 13 Gear selector arm screw
- 14 Gear selector arm
- 15 Gear selector arm pin
- 16 Shaft bearing screw
- 17 Gear selector shaft bearing
- 18 Bellcrank nut
- 19 Inner cross shaft bellcrank
- 20 Bellcrank screw
- 21 Cross shaft bushing
- 22 Transmission shift link screw
- 23 Transmission shift link
- 24 Transmission shift arm nut
- 25 Transmission shift valve arm
- 26 Transmission shift arm screw
- 27 Gear selector link end bearing
- 28 Gear selector link screw
- 29 Inner cross shaft bellcrank key
- 30 Inner cross shaft
- 31 Gear selector link jam nut
- 32 Gear selector link
- 33 Gear selector arm nut
- 34 Gear selector shaft screw
- 35 Range selector control pin
- 36 Range selector control spring
- 37 Range selector control bearing
- 38 Gear selector shaft nut
- 39 Gear selector shaft
- 40 Shaft bearing nut
- 41 Cross shaft bracket
- 42 Gear selector link nut
- 43 Transmission shift link nut
- 44 Outer cross shaft
- 45 Cross shaft bracket key washer
- 46 Cross shaft bracket screw



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Figure 2-153. Transmission range selector control and linkage.

2-214. Engine Disconnect Control (fig. 2-154)

a. Adjustment.

(1) Release control rod lock (3) and push in to fully disengaged position.

(2) Loosen two screws (1 and 4) securing two control rod supports (5) to control rod (6).

(3) Position two control rod supports (5) to maintain 1/32 to 3/32 inch gap between control rod lock (3) and guide (2).

(4) Tighten two screws (1 and 4) to secure two control rod supports (5).

b. Removal.

(1) Remove guide screw and nut (1) and lock screw and nut (6) securing two control rod supports (7) to control rod (8), and remove supports, rod lock (3), bushing (4), and spring (5).

(2) Remove cotter pin (14) and clevis pin (13) securing control rod (8) to vertical rod (15), and remove control rod from guide (2). Discard cotter pin.

(3) Remove screw (16) and washer (17) securing vertical rod (15) to transfer gearcase.

(4) Remove two screws (9), four washers (10), and two nuts (11) securing rear support (12) to regulator bracket, and remove support and vertical rod (15).

c. Inspection and Repair.

(1) Inspect bushing bore for grooves,

scratches, and excessive wear. Remove shallow grooves or scratches. Replace bushing that shows deep grooves, scratches, or excessive wear.

(2) Inspect spring for loss of tension and broken condition. Replace spring that shows either of these defects.

(3) Inspect lock for cracks and excessive wear. Replace lock that shows either of these defects.

(4) Inspect control rod and linkage for cracks and excessive wear. Replace parts that show either of these defects.

d. Installation.

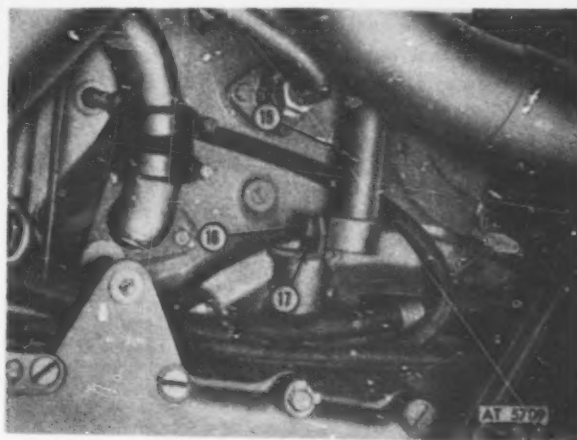
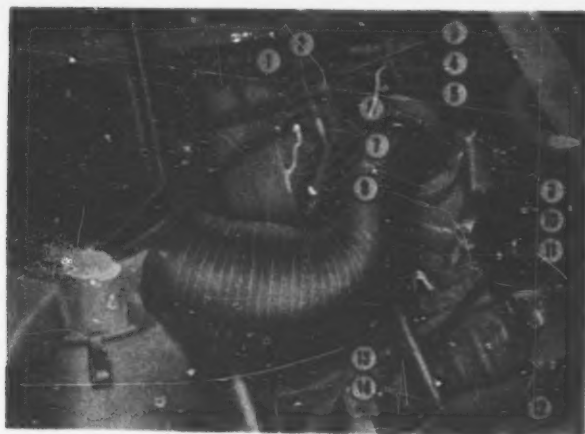
(1) Position vertical rod (15) to transfer gearcase, and secure with screw (16) and washer (17).

(2) Position rear support (12) to vertical rod (15) and to regulator bracket so rod is vertical, and secure with two screws (9), four washers (10), and two nuts (11).

(3) Position control rod (8) in control guide (2) and to vertical rod (15), and secure at vertical rod end with clevis pin (13) and new cotter pin (14).

(4) Position spring (5), bushing (4), rod lock (3), and two control rod supports (7) in control rod (8) and control guide (2), and secure with guide screw and nut (1) and lock screw and nut (6).

(5) Adjust engine disconnect control (a above).



- 1 Guide screw and nut
- 2 Control guide
- 3 Rod lock
- 4 Bushing
- 5 Spring
- 6 Lock screw and nut
- 7 Control rod support
- 8 Control rod
- 9 Rear support screw

- 10 Rear support washer
- 11 Rear support nut
- 12 Rear support
- 13 Clevis pin
- 14 Cotter pin
- 15 Vertical rod
- 16 Vertical rod screw
- 17 Vertical rod washer

Figure 2-154. Engine disconnect control.

Section XXV. HULL

2-215. General

a. Scope. This section contains instructions for removal, disassembly, adjustment, inspection and repair, assembly, and installation of the tailgate, tailgate handle, handle latch, and seal; power plant access covers and grilles, cab floor plates; hull bottom access cover and drain plates, cab doors, door handles and linkage, seals, and windows; driver's and personnel seats, cushions, and backrests; windshield; towing eyes and pintle; blast cover, bolt fastener, and over-center fastener; and blast shield.

b. Description.

(1) *Hull.* The welded hull, constructed of aluminum panels, internal bulkheads, stiffeners, and supports, is divided into three main areas: the driver's and personnel cab, located in the front of the carrier, consists of a removable windshield assembly containing three window panels, left and right-hand doors with sliding window panels, driver's and personnel seats, and hinged center seat support and floor plates; the power plant compartment, located below the driver's and personnel cab, houses the power train components; and the rear compartment contains the fuel compartment which is an integral part of the hull, a fuel expansion tank, and threaded mounts and fittings to attach the intercept subsystems. A hinged tailgate is lowered for use. When closed, the tailgate provides lateral structural support for the hull sides, and forms a watertight closure. A fold-out cover is mounted over the power plant compartment to protect the driver's and personnel cab interior from missile blast pressure, heat, and gasses. Mounted

on the outside of the power plant compartment rear bulkhead is a blast shield to protect the power plant compartment from missile blast damage.

(2) *Blast cover.* The blast cover, constructed of aluminum alloy, is a hinged assembly that is secured with four latch bolts in the front of the driver's and personnel cab and three clamps attached to each side of the outer hull surface. The blast cover assembly consists of two hinged half-cover assemblies; a front half-cover assembly consisting of a center cover assembly, a left cover assembly, and a right cover assembly which are hinged together. Either the left or right cover assembly can be opened independently. The rear half-cover assembly is similar to the front half-cover assembly. The rear half-cover assembly can be opened and folded over the front half-cover assembly to expose the top of the power plant compartment and secured in the folded position with two straps.

(3) *Blast shield.* The blast shield, constructed of aluminum alloy armor is bolted in five places across the top of the power plant compartment rear bulkhead. There are two adjustable shoes located near the bottom of the blast shield to allow adjustment of the shield to the intercept system platform.

c. Lubrication. Service sliding and turning parts with GAA lubricant at assembly or installation in accordance with LO 9-1450-585-12.

d. Torque Wrench Specifications. Refer to table 2-26 for torque tightness reading for the more critical points of the hull.

Table 2-26. Hull Torque Wrench Specifications

Fig. No.	Key No.	Location	Pound-feet torque
2-170		Towing eye-to-hull screw	130 - 140
2-173		Lifting eye-to-hull screw	175 - 200

2-216. Tailgate Handle Latch (fig. 2-155)

a. Removal. Remove grooved pin (8) securing latch handle (11), compression spring (10), and flat washer (9) to bracket on tailgate, and remove latch handle, spring, and washer.

b. Inspection and Repair.

(1) Inspect spring for breaks and loss of tension. Replace spring that shows either of these defects.

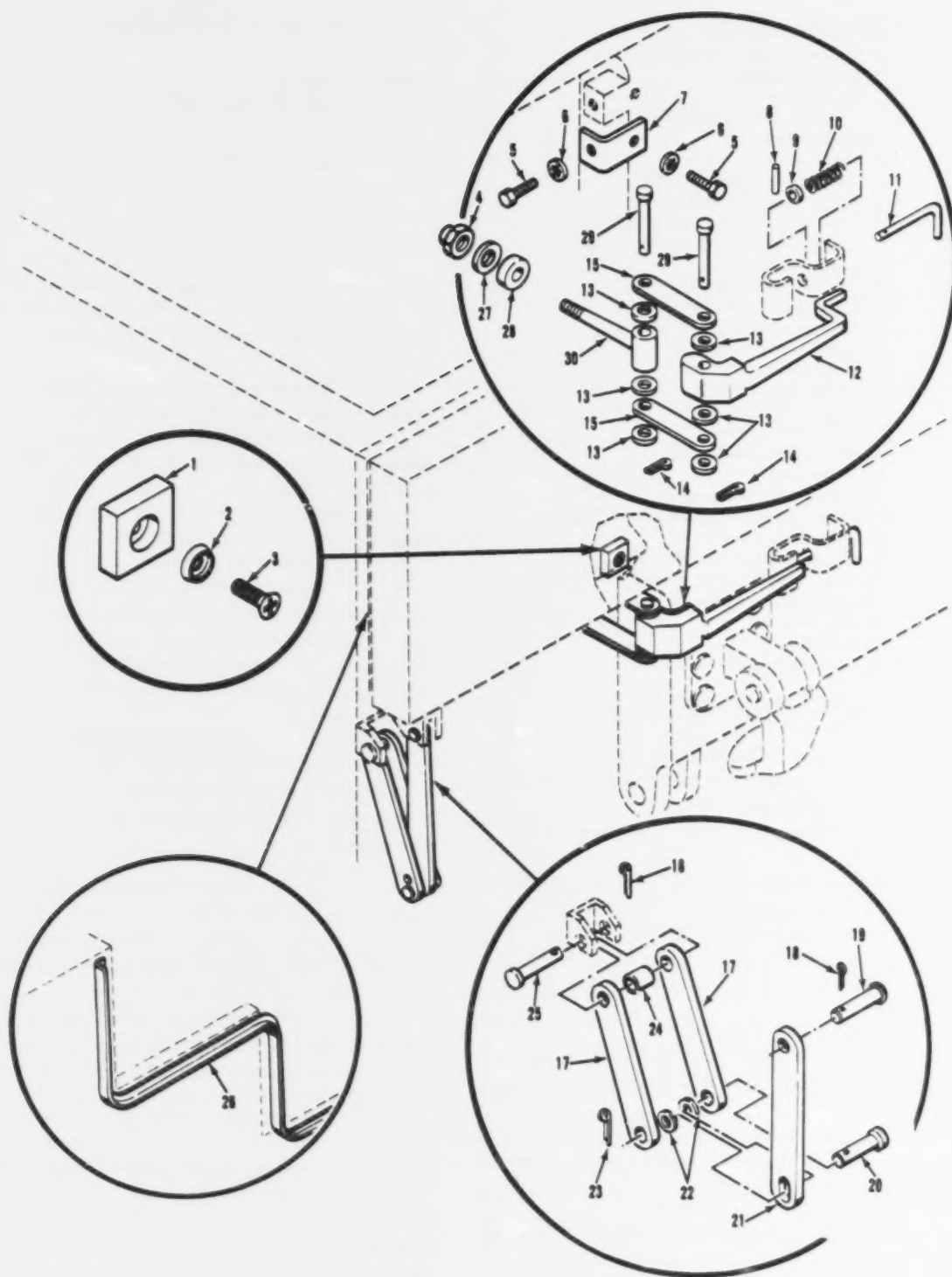
(2) Inspect latch handle for cracks and

distortion. Repair distorted latch handle. Replace latch handle that is cracked.

c. Installation. Position spring (10), washer (9), and latch handle (11) in bracket on tailgate, and secure with pin (8).

NOTE

To prevent tip of handle (11) from pulling through bracket when spring (10) is fully compressed, install washers (9) as required behind spring and pin.



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Figure 2-155. Tailgate controls, linkage, seal, and bumpers.

LEGEND to fig. 2-155

- 1 Tailgate rubber bumper
- 2 Bumper washer
- 3 Bumper screw
- 4 Eye bolt self-locking nut
- 5 Strike screw
- 6 Strike washer
- 7 Tailgate lock handle strike
- 8 Latch handle grooved pin
- 9 Latch handle flat washer
- 10 Latch handle compression spring
- 11 Latch handle
- 12 Tailgate lock handle
- 13 Lock handle link flat washer
- 14 Link pin cotter pin
- 15 Lock handle link
- 16 Upper link cotter pin
- 17 Upper support link
- 18 Center link cotter pin
- 19 Center link headed pin
- 20 Center link headed pin
- 21 Lower link
- 22 Lower link flat washer
- 23 Center link headed pin cotter pin
- 24 Upper link spacer
- 25 Upper link headed pin
- 26 Tailgate seal
- 27 Eye bolt flat washer
- 28 Eye bolt seal
- 29 Link pin
- 30 Lock handle eye bolt

2-217. Tailgate Support Linkage
(fig. 2-155)

a. Removal and Disassembly.

- (1) Remove cotter pin (18) and headed pin (19). Discard cotter pin.
- (2) Place tailgate in lowest position (TM 9-1450-585-10).
- (3) Remove cotter pin (16), headed pin (25), linkage, and link spacer (24). Discard cotter pin.
- (4) Remove cotter pin (23), headed pin (20), and two washers (22) securing two upper links (17) to lower link (21), and separate links. Discard cotter pin.

b. Inspection and Repair.

- (1) Inspect headed pins for breaks and excessive wear. Replace pins that show either of these defects.
- (2) Inspect latch handle for cracks and distortion. Repair distorted latch handle. Replace latch handle that is cracked.

c. Assembly and Installation.

- (1) Position two upper links (17) on lower link (21), install headed pin (20) and two washers (22), and secure with new cotter pin (23).
- (2) Position linkage to tailgate, install link spacer (24) and headed pin (25), and secure with new cotter pin (16).
- (3) Place tailgate in closed position (TM 9-1450-585-10).
- (4) Position lower link (21) in tailgate, and

secure with headed pin (19) and new cotter pin (18).

2-218. Tailgate
(fig. 2-156)

a. Removal.

- (1) Support tailgate (1) with suitable lifting device.
- (2) Remove two headed pins (2) from two tailgate linkages (3).
- (3) Disengage two latch handles (11, fig. 2-155), and release two tailgate lock handles (12).
- (4) Remove two nuts (5, fig. 2-156) securing center hinge shaft (9), and remove shims (13) and shaft.
- (5) Remove two nuts (11) and bolts (10), and remove tailgate (1) from carrier.
- (6) Remove four screws (6) and washers (7) securing center hinge (8) to hull, and remove hinge and shim (12).

(7) Remove center hinge bushing (4) from tailgate half of center hinge (8).

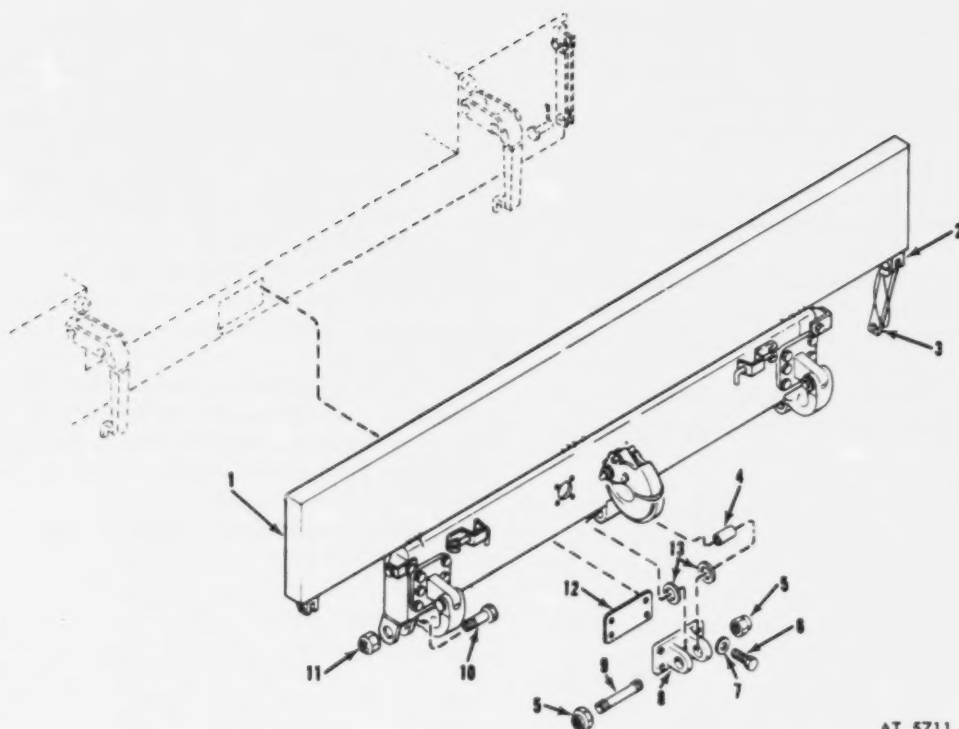
b. Inspection and Repair.

(1) Inspect tailgate for distortion, cracks, damaged seals, and broken or missing parts. Repair minor distortion and cracks. Replace broken or missing parts. Refer to paragraph 2-220 for seal replacement. Replace tailgate that is damaged beyond repair.

(2) Inspect center hinge bushing in position on tailgate half of center hinge for broken or worn bushing, and determine if replacement of bushing is necessary. Replace bushing that shows either of these defects.

c. Installation.

- (1) Install center hinge bushing (4) to tailgate half of center hinge (8).
- (2) Support tailgate (1) with suitable lifting device, position tailgate on carrier, and align outer hinge mounting holes.
- (3) Install two outer hinge bolts (10), and secure with two nuts (11).
- (4) Position center hinge (8) with shims (12) as required on hull for proper alignment of center hinge shaft mounting holes, and secure hinge with four screws (6) and washers (7). Laminated shims may be peeled to obtain proper hole alignment.
- (5) Position center hinge shaft (9) with shims (13) as required on both sides of hinge to obtain minimum side movement of tailgate, and secure shaft with two nuts (5).
- (6) Close tailgate, secure two tailgate lock handles, and remove lifting device.
- (7) Install two headed pins (2) in two tailgate linkages (3).
- (8) Adjust tailgate lock handles (para 2-219).



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- 1 Tailgate
- 2 Headed pin
- 3 Tailgate linkage
- 4 Center hinge bushing
- 5 Center hinge shaft nut
- 6 Center hinge screw
- 7 Center hinge washer

- 8 Center hinge
- 9 Center hinge shaft
- 10 Outer hinge bolt
- 11 Outer hinge nut
- 12 Center hinge shim
- 13 Center hinge shaft shim

Figure 2-156. Tailgate.

2-219. Tailgate Lock Handle (fig. 2-155)

a. Adjustment. Tighten self-locking nut (4) securing eye bolt (30) to hull until tailgate seal (26) is depressed $\frac{1}{4}$ to $\frac{1}{2}$ inch.

b. Removal.

(1) Disengage two lock handles (12) from two latch handles (11), and lower tailgate.

(2) Remove self-locking nut (4) and flat washer (27) securing eye bolt (30) to hull in cargo compartment.

(3) Remove eye bolt (30) and lock handle (12) as a unit from hull, and remove eye bolt seal (28) from hull.

(4) Remove two cotter pins (14) and two link pins (29) securing two lock handle links (15) and six flat washers (13) to lock handle (12) and eye bolt (30), and remove lock handle links, flat washers, eye bolt, and lock handle. Discard cotter pins.

(5) Remove two screws (5) and washers (6), and remove lock handle strike (7).

c. Inspection and Repair.

(1) Inspect lock handle, lock handle links, link pins, and strike for burs, chips, cracks, and excessive wear. Remove burs. Replace parts that show any of the other defects.

(2) Inspect eye bolt seal for loss of resiliency and cracked or broken condition. Replace seal that shows any of these defects.

d. Installation.

(1) Position two lock handle links (15) and six flat washers (13) on eye bolt (30) and lock handle (12), and secure with two link pins (29) and new cotter pins (14).

(2) Install eye bolt seal (28) in hull.

(3) Position lock handle (12) and eye bolt (30) as a unit through eye bolt seal (28) and hull, and secure with flat washer (27) and self-locking nut (4).

- (4) Close tailgate, and engage two lock handles (12) with two latch handles (11).
- (5) Adjust lock handle (12) (a above).

2-220. Tailgate Seals and Bumpers (fig. 2-155)

a. Removal.

(1) Tailgate seal.

(a) Bend seven retaining strips from tailgate seals (26).

(b) Remove and discard seal. One upper tailgate-to-hull corner seal is bonded to each end of tailgate seal, and both seals must be replaced when tailgate seal is replaced.

(2) Tailgate bumper. Remove screw (3) and washer (2) from hull, and remove tailgate bumper (1).

b. Inspection and Repair.

(1) Before removal, inspect tailgate seal and bumpers for loss of resiliency, cracks, and breaks. Replace seal or bumper that shows any of these defects.

(2) Inspect upper tailgate-to-hull corner seals for damaged or missing seals. Replace damaged or missing seal.

c. Installation.

(1) Tailgate seal.

(a) Position tailgate seal (26) in retaining strips.

(b) Bend retaining strips against seal (26).

(2) Upper tailgate-to-hull corner seals (fig. 2-157).

(a) Clean and dry rear edge of side hull plates and tailgate seal.

(b) Apply adhesive primer Dow Corning 1200 (quart can) from top of rear edge of side hull plates and tailgate seal to a depth of $1\frac{3}{4}$ to $2\frac{1}{4}$ inches.

(c) With tailgate closed, fill primed area with black adhesive sealant MIL-A-46106. Sealant must adhere to both seal and edges of side plates, but not to the tailgate. Allow to dry 24 hours at room temperature to cure.

(3) Tailgate bumper. Position tailgate bumper (1) on hull, and secure with screw (3) and washer (2).

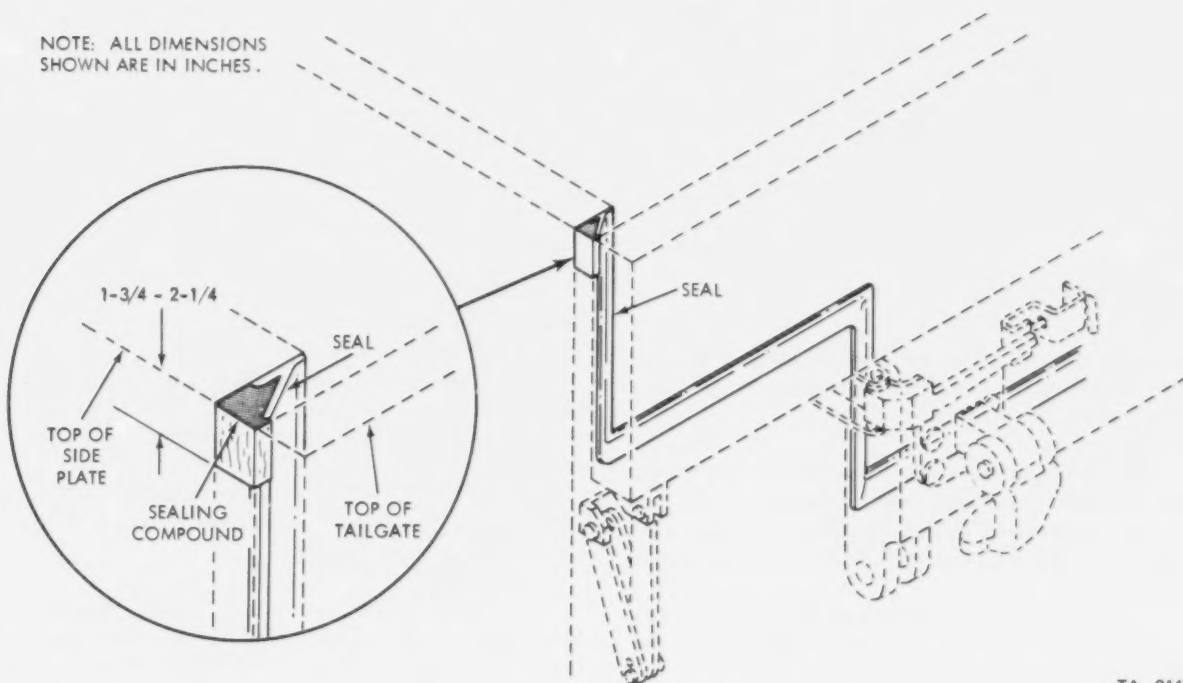


Figure 2-157. Sealing hull and tailgate.

2-221. Power Plant Access Covers and Grilles

a. Removal.

(1) Top access covers. The blast cover forms

the top access cover. Refer to paragraph 2-239 for removal.

(2) Power plant intake and exhaust grilles (fig. 2-158).

NOTE

Intake and exhaust grilles are removed in a similar manner.

- (a) Release two over-center fasteners.
- (b) Lift grille at fastener side, and pull grille from support.
- (3) *Rear access covers* (fig. 2-159).
 - (a) Remove blast shield (para 2-240).
 - (b) Disengage three screw fasteners securing each round cover to bulkhead, and remove covers.
 - (c) Disengage four screw fasteners ($\frac{1}{4}$ turn) securing rectangular cover to bulkhead, and remove cover from three lower spring clips.
 - (d) If inspection (b (2) below) indicates gasket replacement is necessary, remove gasket from round exhaust well cover. Discard gasket.

b. Inspection and Repair.

- (1) Inspect intake and exhaust grilles for cracks, warping, bent dowels, and missing or damaged rubber bumpers. Weld small cracks, and straighten minor warping. Replace missing or damaged bumpers. Replace grille that is damaged beyond repair.
- (2) Inspect round exhaust well cover gasket for loss of resiliency, breaks, and cracks. Replace gasket that shows any of these defects.
- (3) Inspect covers for cracks, deformation, and broken fasteners. Weld small cracks, and straighten minor deformations. Replace broken

fasteners. Replace covers that are damaged beyond repair.

c. Installation.

- (1) *Rear access covers* (fig. 2-159).
 - (a) If inspection (b (2) above) indicates round exhaust well cover gasket replacement is necessary, install new gasket on cover using adhesive MIL-A-5092.
 - (b) Position rectangular cover in three lower spring clips on bulkhead, and secure with four screw fasteners.
 - (c) Position round covers on bulkhead, and secure each cover with three screw fasteners.
 - (d) Install blast shield (para 2-240).
- (2) *Power plant intake and exhaust grilles* (fig. 2-158).

NOTE

Intake and exhaust grilles are installed in a similar manner.

- (a) Place grille in position with eight rubber bumpers facing down and grille-to-support dowels pointing toward center of carrier.
- (b) Aline grille-to-support dowels with holes in blast cover support, and push dowels into holes while lowering grille.
- (c) Secure two over-center fasteners to lock grille in place.
- (3) *Top access cover.* The blast cover forms the top access cover. Refer to paragraph 2-239 for installation.

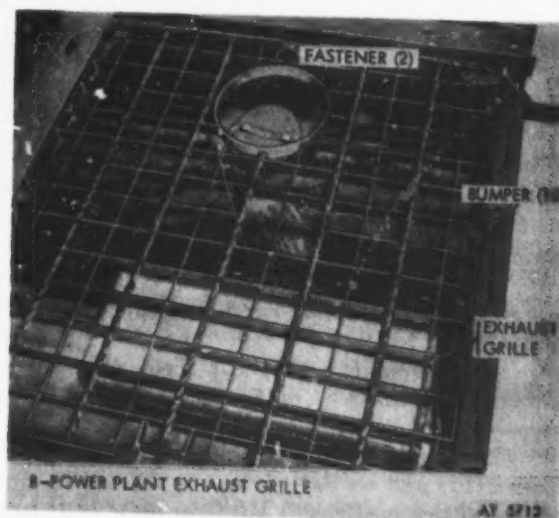
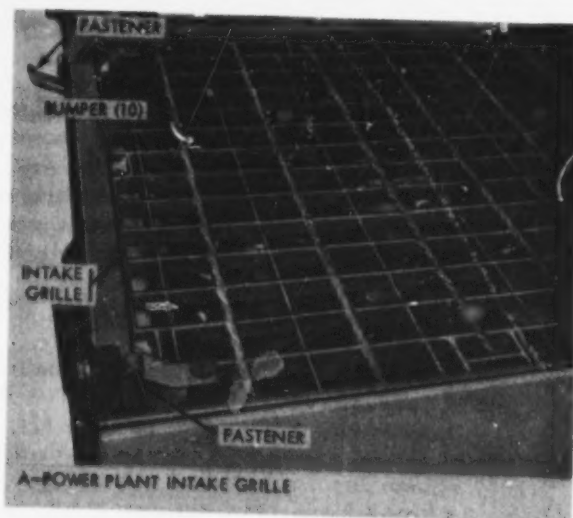


Figure 2-158. Power plant intake and exhaust grilles.

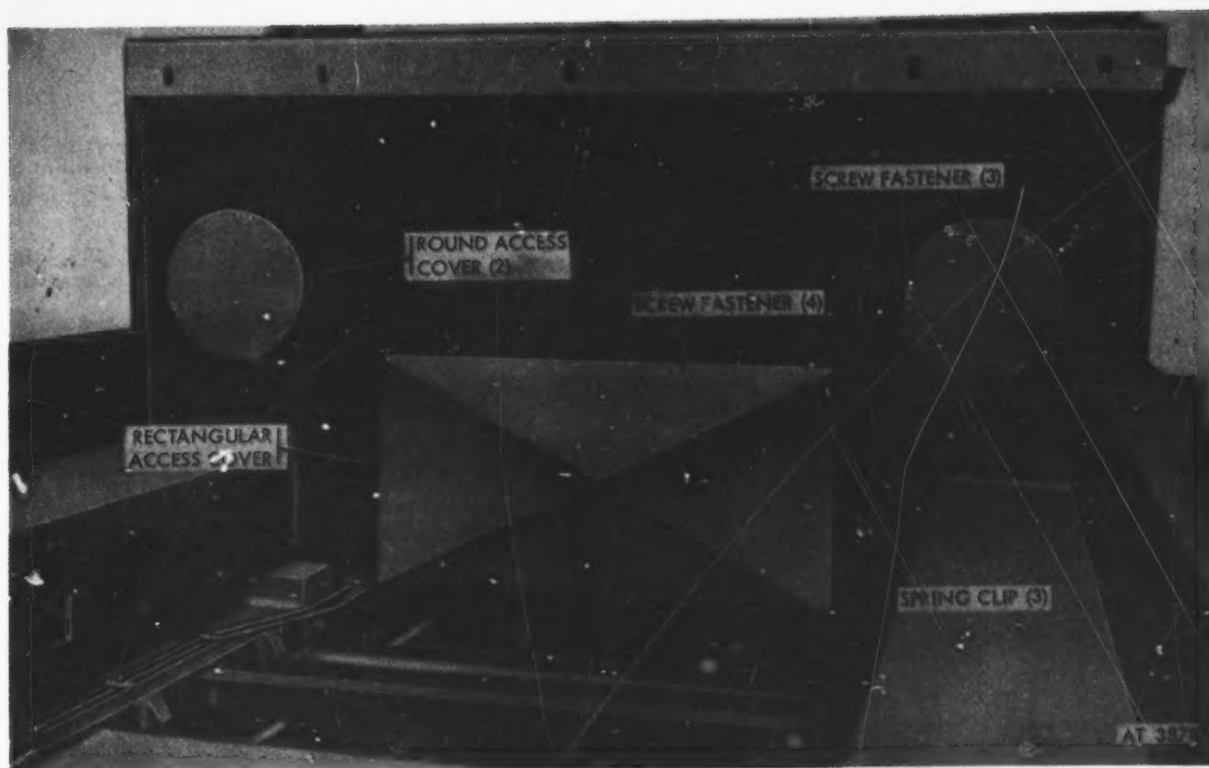


Figure 2-159. Power plant rear access covers.

2-222. Cab Floor Plates (fig. 2-160)

a. Removal.

(1) Center floor plates.

NOTE

Both center floor plates are removed in a similar manner.

(a) Disengage two tee bolts (1) and latches (16) securing plate (15) to cab floor (2), and raise plate.

(b) Remove three nuts (5), six washers (4), and three screws (3), and remove plate (15) from seat support (14).

(c) Remove gasket (6) from plate if inspection (b below) indicates replacement is necessary.

(2) *Driver's left floor plate.* Remove six screws (11) and six flat washers (12) from six nuts (13), and remove driver's left floor plate (10) from cab floor (2).

(3) *Driver's right floor plate.*

(a) Remove eight screws (18) and flat washers (19) securing driver's right floor plate (8) to eight nuts (20), and on carriers C-39 and above, remove plate from cab floor.

(b) On carriers C-1 through C-38, loosen

screw (9), and remove plate (8) from cab floor.

(c) If plate (8) is to be replaced, remove stop screw (7) and nut (17) from plate.

b. Inspection and Repair.

(1) Inspect gaskets for loss of resiliency, breaks, and cracks. Replace gasket that shows any of these defects.

(2) Inspect floor plates for distortion, cracks, and worn areas. Repair minor distortions, cracks, and worn areas. Replace plate that is damaged beyond repair.

c. Installation.

(1) *Driver's right floor plate.*

(a) If plate is being replaced, install stop screw (7) and nut (17) on plate (8).

(b) Position plate (8) to cab floor (2), and secure plate with eight screws (18) and flat washers (19).

(c) On carriers C-1 through C-38, install screw (9) to secure plate to floor.

(2) *Driver's left floor plate.* Position plate (10) to cab floor (2), and secure plate with six screws (11) and flat washers (12).

(3) *Center floor plates.*

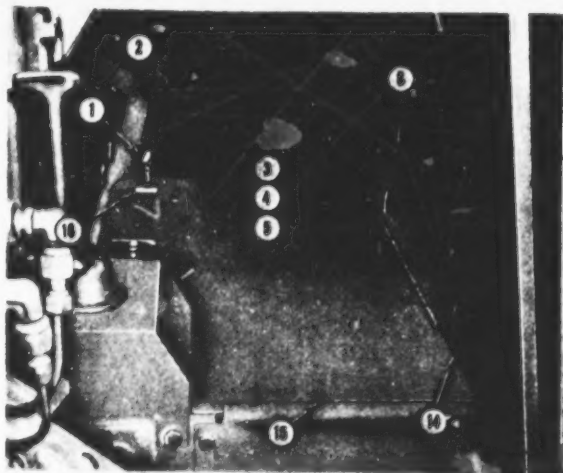
NOTE

Both center floor plates are installed in a similar manner.

(a) If gasket (6) replacement is necessary, thoroughly clean and dry mating surfaces of plate (15) and new gasket, coat each mating surface with adhesive MIL-A-5092 (8040-00-290-4301) and install new gasket on plate.

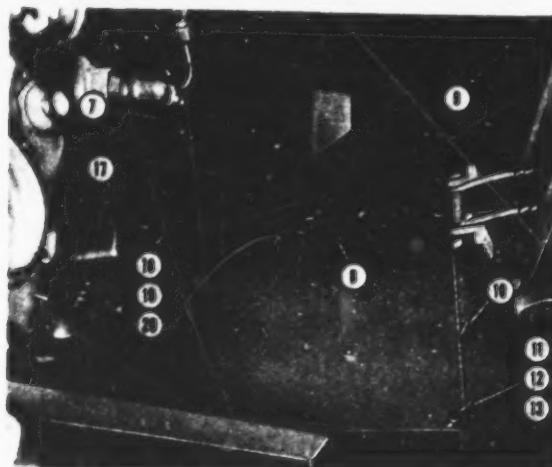
(b) Position plate to seat support (14), and secure with three screws (3), six washers (4), and three nuts (5).

(c) Lower plate, engage two latches (16) and tee bolts (1), and secure plate to cab floor (2).



A-CENTER FLOOR PLATES

- 1 Center floor plate tee bolt
- 2 Cab floor support stiffener
- 3 Center floor plate screw
- 4 Center floor plate washer
- 5 Center floor plate nut
- 6 Center floor plate gasket
- 7 Accelerator pedal stop screw
- 8 Driver's right floor plate
- 9 Upper right floor plate screw
- 10 Driver's left floor plate



B-DRIVER'S FLOOR PLATES

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- 11 Driver's left floor plate screw
- 12 Driver's left floor plate washer
- 13 Driver's left floor plate nut
- 14 Personnel seat support
- 15 Center floor plate
- 16 Center floor plate latch
- 17 Accelerator pedal adjusting stop nut
- 18 Right floor plate screw
- 19 Right floor plate washer
- 20 Right floor plate nut

Figure 2-160. Cab floor plates.

2-223. Hull Bottom Access Cover and Drain Plates (fig. 2-161)

a. Removal.

(1) *Power plant bottom access cover.*

(a) Remove eight screws and washers securing cover to hull bottom, and remove cover.

(b) If inspection (b (1) below) indicates gasket replacement is necessary, remove and discard gasket.

(2) *Hull bottom drain plates.*

NOTE

Both hull bottom drain plates are removed in a similar manner.

(a) Remove four screws and washers

securing drain plate to hull bottom, and remove drain plate.

(b) If inspection (b (1) below) indicates gasket replacement is necessary, remove and discard gasket.

b. Inspection and Repair.

(1) Inspect gasket for loss of resiliency, breaks, and cracks. Replace gasket that shows any of these defects.

(2) Inspect cover and drain plate for breaks, cracks, and deformation. Replace parts that show any of these defects.

c. Installation.

(1) *Hull bottom drain plates.*

NOTE

Both hull bottom drain plates are installed in a similar manner.

(a) If inspection (b (1) above) indicates gasket replacement is necessary, thoroughly clean and dry mating surfaces of drain plate and new gasket, coat one surface with cement MIL-A-5092 (8040-00-290-4301), and install new gasket on drain plate.

(b) Position drain plate on hull bottom, and secure with four screws and washers.

(2) Power plant bottom access cover.

(a) If inspection (b (1) above) indicates gasket replacement is necessary, thoroughly clean and dry mating surfaces of cover and new gasket, coat one surface with cement MIL-A-5092 (8040-00-290-4301), and install new gasket on cover.

(b) Position access cover on hull bottom, and secure with eight screws and washers.

2-223.1. Tool Compartment Access Cover (fig. 2-260.1 M730A1)

a. Removal

(1) Disengage two tee bolts (2) and latches (4) securing access cover (1) to right seat support panel (9) and raise cover.

(2) Remove three nuts (10), six washers (6), and three screws (5) securing cover (1) to right seat support panel (9) and remove cover.

(3) Remove seals (8) from cover if inspection indicates replacement is necessary.

(4) Remove two cotter pins (7) from tee bolts (2). Remove tee bolts (2), washers (3), and latches (4) from access cover (1). Discard cotter pins.

b. Inspection and Repair.

(1) Inspect seals for loss of resiliency and breaks. Replace seals that show these defects.

(2) Inspect cover for breaks, cracks, and deformation. Replace cover if defective.

(3) Inspect screws, nuts, and tee bolts for defective threads. Repair threads or replace parts.

c. Installation.

(1) If seal (8) replacement is necessary, thoroughly clean and dry mating surfaces of cover (1) and new seal, coat each mating surface with adhesive EC2141 (8040-00-664-4318), and allow adhesive to dry until tacky but no longer transfers to finger when touched lightly. Install new seal (8) on cover (1).

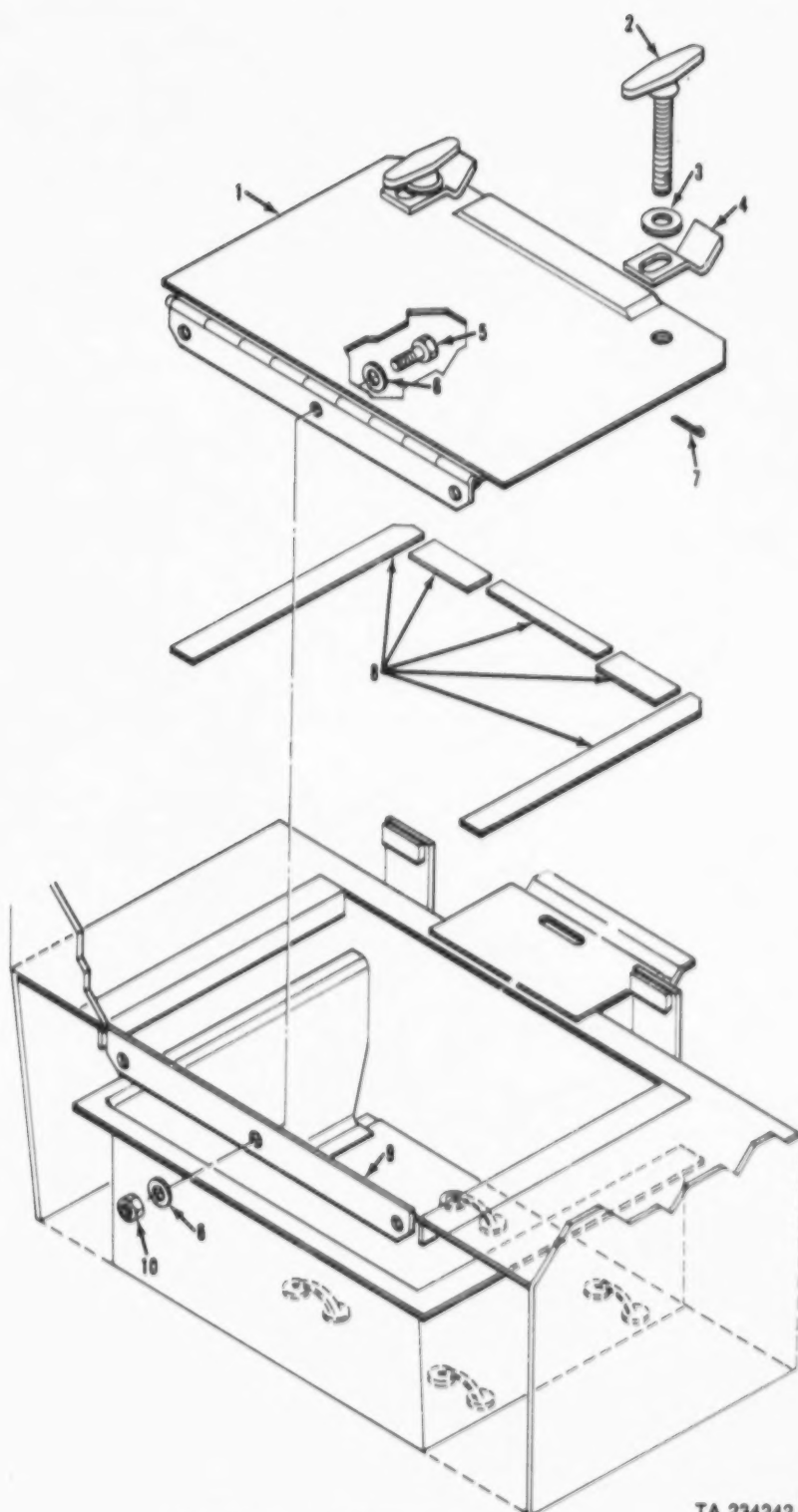
(2) Position cover hinge to right seat support panel (9) and secure with three screws (5), six washers (6), and three nuts (10).

(3) Install two tee bolts (2), washers (3), and latches (4) in cover (1) and secure with two new cotter pins (7).

(4) Lower cover, engage two latches (4) and tee bolts (2) to secure cover.

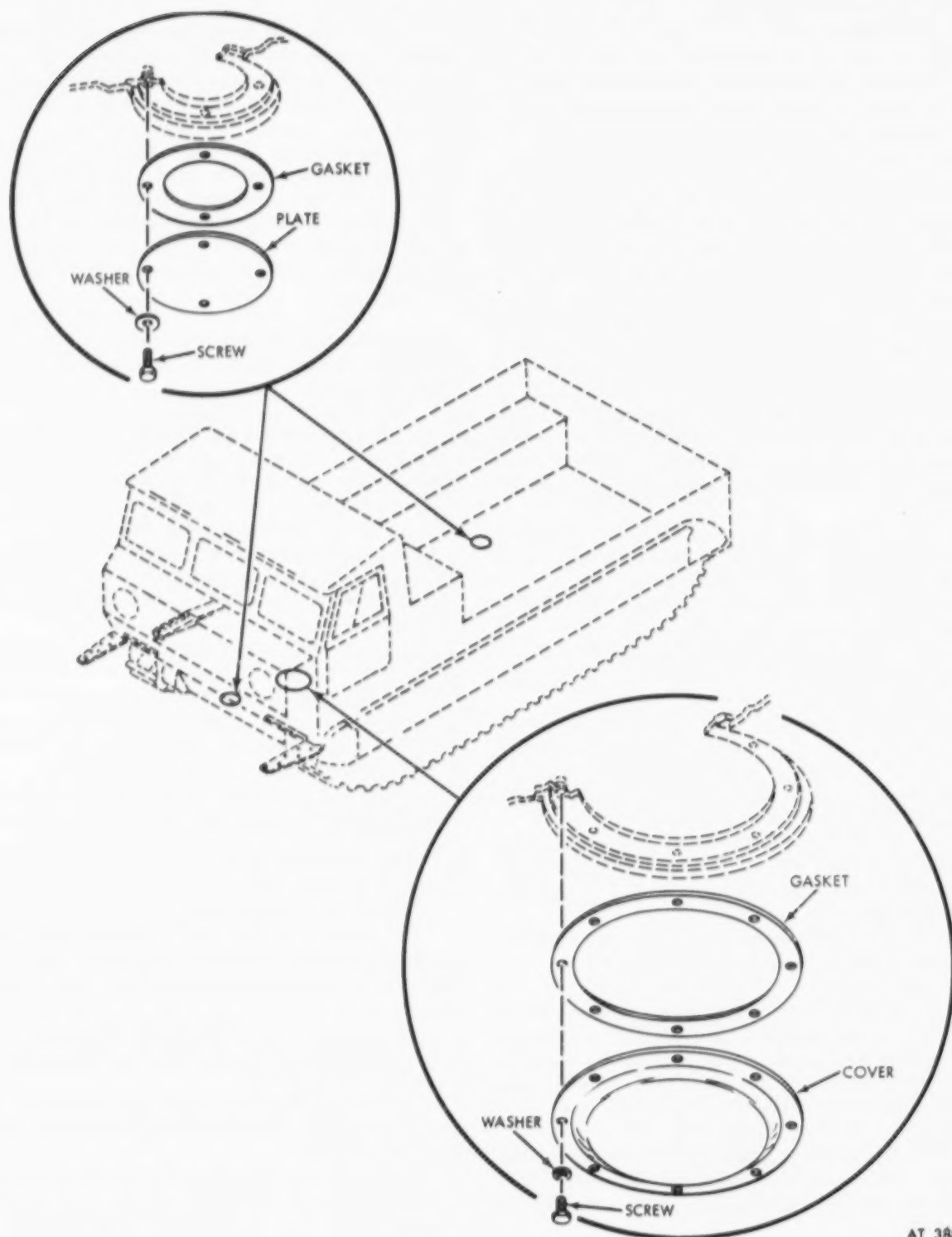
Legend to fig. 2-160.1.

- 1 Access cover assembly
- 2 Tee bolt (2)
- 3 Washer (2)
- 4 Latch (2)
- 5 Screw (3)
- 6 Washer (6)
- 7 Cotter pin (2)
- 8 Seal (5)
- 9 Right seat support panel
- 10 Nut (3)



TA 234242

Figure 2-160.1. Tool compartment access cover.



AT 3680

Figure 2-161. Hull bottom access cover and drain plates.

2-224. Cab Door, Handles, Hinges, and Linkage
(fig. 2-162)

NOTE

Maintenance procedures for left and right cab door handles, hinges, and linkage are similar.

a. Adjustments.

(1) Catch adjustment.

(a) Make certain latch and catch fully engage. If necessary, remove two screws and washers securing catch to hull, and add or remove shims as required for full engagement. Reinstall catch with two screws and washers.

(b) Adjust catch for proper door sealing by loosening two screws and sliding catch to increase or decrease tension on seal. Tighten screws.

(2) Door adjustments.

(a) On carriers C-1 through C-39: Top edge of door should align with top edge of hull. If alinement is necessary, determine number of shim washers required for proper alinement, and proceed as follows:

1. Remove two screws (30), washers (31), and shim washer(s) securing bottom two hinge lugs (38), and remove bottom lug.

2. Add or remove shim washer(s) (34) for proper alinement of door and hull.

3. Install lug (38) on strap (37), position shim washer(s), and secure with two screws (30) and washers (31).

(b) On carriers after C-39: Top edge of door should align with top of hull. If alinement is necessary, determine number of shim washers required for proper alinement, and proceed as follows:

1. Remove lower hinge cotter pin (35), washer (32), and pin (24), and add shim washer(s) (34) to obtain proper door and hull alinement. Discard cotter pin.

2. Install hinge pin (24), washer (32), and new cotter pin (35).

b. Removal.

(1) Remove cab door window (para 2-226).

(2) On carriers C-1 through C-39: Remove four screws (30), washers (31), and shim washer(s) (34) securing four hinge lugs (38) to hull, and remove door (9). Separate hinge lugs and shim washer(s) (29) from hinge straps (37).

(3) On carriers after C-39: Remove four screws (30), washers (31), and shim washer(s) (34) securing two hinge lugs (33) to hull, and remove door (9).

c. Disassembly.

(1) Door handle and latch.

(a) Remove latch-to-chain linkage pin (44)

securing linkage (36) to latch (18), and disengage linkage.

(b) Remove cotter pin (2), pin (3), and outside handle (5). Discard cotter pin.

(c) Remove two nuts (20) securing strap loop (21) to door (9), and remove loop and strap (22).

(d) Remove six screws (1), nuts (20), and two washers (8) securing top bracket (4), bottom bracket (6), lock bracket (39), and latch housing (43) to door (9), and remove brackets and housing.

(e) Separate door latch (18) and spring (19) from latch housing (43), and remove latch pin (7) from latch.

(f) Remove two screws (13) and washers (14) securing catch (15) and backup plate (17) to hull, and remove catch, catch shim(s) (16), and backup plate.

(2) Door hinge straps.

(a) On carriers C-1 through C-39: Remove four screws (28) and washers (27) securing chain linkage (36) and two hinge straps (37) to door (9), and remove straps and linkage.

(b) On carriers after C-39:

1. Remove four screws (28), washers (27), and two locking plates (26) securing chain linkage (36) and two hinge straps (25) to door (9), and remove linkage and straps.

2. Remove two cotter pins (35), washers (32), hinge pins (24), and shim washer(s) (29) (bottom hinge only), and separate lugs, straps, and shim washer(s) (29) (bottom hinge only), and separate lugs, straps, and shim washer(s). Discard cotter pins.

(3) **Door pad.** Remove two screws (12) and washers (11) securing door pad (10) to door (9), and remove pad.

(4) **Door seal.** Refer to paragraph 2-225 for removal of door seal.

d. Inspection and Repair.

(1) Inspect handle, latch, housing, hinge lugs, hinge straps, pins, and chain for breaks, distortion, and cracks. Replace parts that show any of these defects.

(2) Inspect threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

(3) Inspect latch spring for loss of tension and broken condition. Replace spring that shows either of these defects.

(4) Inspect door seal, pad, and chain linkage cover for loss of resiliency, cracks, and breaks. Replace parts that show any of these defects.

(5) Inspect strap for broken or frayed strands. Replace strap that shows either of these defects.

e. Assembly.

(1) *Door seal.* Refer to paragraph 2-225 for installation of door seal.

(2) *Door pad.* Position pad (10) on door (9), and secure with two screws (12) and washers (11).

(3) *Door hinge lugs and straps.*

(a) On carriers C-1 through C-39: Position two hinge straps (37) and front end of chain linkage (36) on door (9), and secure with four screws (28) and washers (27).

(b) On carriers after C-39:

1. Position two hinge straps (25), locking plates (26), and front end of chain linkage (36) on door (9), and secure with four screws (28) and washers (27).

2. Position two hinge lugs (33) in two hinge straps (25), and secure with two hinge pins (24), washers (32), and new cotter pins (35).

(4) *Door handle and latch.*

(a) Press latch pin (7) into door latch (18) so that pin extends $\frac{1}{2}$ inch out of latch, and assemble latch spring (19) and latch (18) into latch housing (43).

(b) Position latch housing (43), top bracket (4), bottom bracket (6), and lock bracket (39) on door (9), and secure with six screws (1), nuts (20), and two washers (8).

(c) Attach strap (22) to strap loop (21), position loop on door, and secure with two nuts (20).

(d) Position outside handle (5) on top bracket (4) and bottom bracket (6), and secure with pin (3) and new cotter pin (2).

(e) Engage rear end of chain linkage (36) with door latch (18), and press latch-to-chain linkage pin (44) through linkage and latch so that pin is centered in latch.

(f) Position catch (15), shim(s) (16), and backup plate (17) on hull, and secure with two screws (13) and washers (14).

f. Installation.

(1) On carriers C-1 through C-39: Install four hinge lugs (38) on door (assembled in *e* above), position lugs on hull, and secure with four screws (30), washers (31), and shim washer(s) (34) to assure proper sealing of door seal at hinge end of door.

(2) On carriers after C-39: Position two hinge lugs (33) with door (assembled in *e* above) on hull, and secure with four screws (30), washers (31), and shim washer(s) (34) to assure proper sealing of door seal at hinge end of door.

(3) Adjust door and catch (*a* above).

(4) Install door window (para 2-226).

LEGEND to fig. 2-162

- 1 Bracket mounting screws
- 2 Outside handle cotter pin
- 3 Outside handle pin
- 4 Top bracket
- 5 Outside handle
- 6 Bottom bracket
- 7 Latch pin
- 8 Bracket washer
- 9 Cab door
- 10 Door pad
- 11 Door pad washer
- 12 Door pad screw
- 13 Door catch screw
- 14 Door catch washer
- 15 Door catch
- 16 Door catch shim
- 17 Catch backup plate
- 18 Door latch
- 19 Latch spring
- 20 Bracket nut
- 21 Strap loop
- 22 Strap
- 23 Door seal
- 24 Hinge pin (carriers after C-39)
- 25 Hinge strap (carriers after C-39)
- 26 Hinge strap locking plate
- 27 Hinge strap washer
- 28 Hinge strap screw
- 29 Hinge strap shim washer
- 30 Hinge lug screw
- 31 Hinge lug washer
- 32 Hinge pin washer (carriers after C-39)
- 33 Hinge lug (carriers after C-39)
- 34 Hinge lug shim washer
- 35 Hinge pin cotter pin
- 36 Chain linkage
- 37 Hinge strap (carriers C-1 through C-39)
- 38 Hinge lug (carriers C-1 through C-39)
- 39 Lock bracket
- 40 Chain linkage nut
- 41 Chain linkage washer
- 42 Chain linkage screw
- 43 Door latch housing
- 44 Latch-to-chain linkage pin

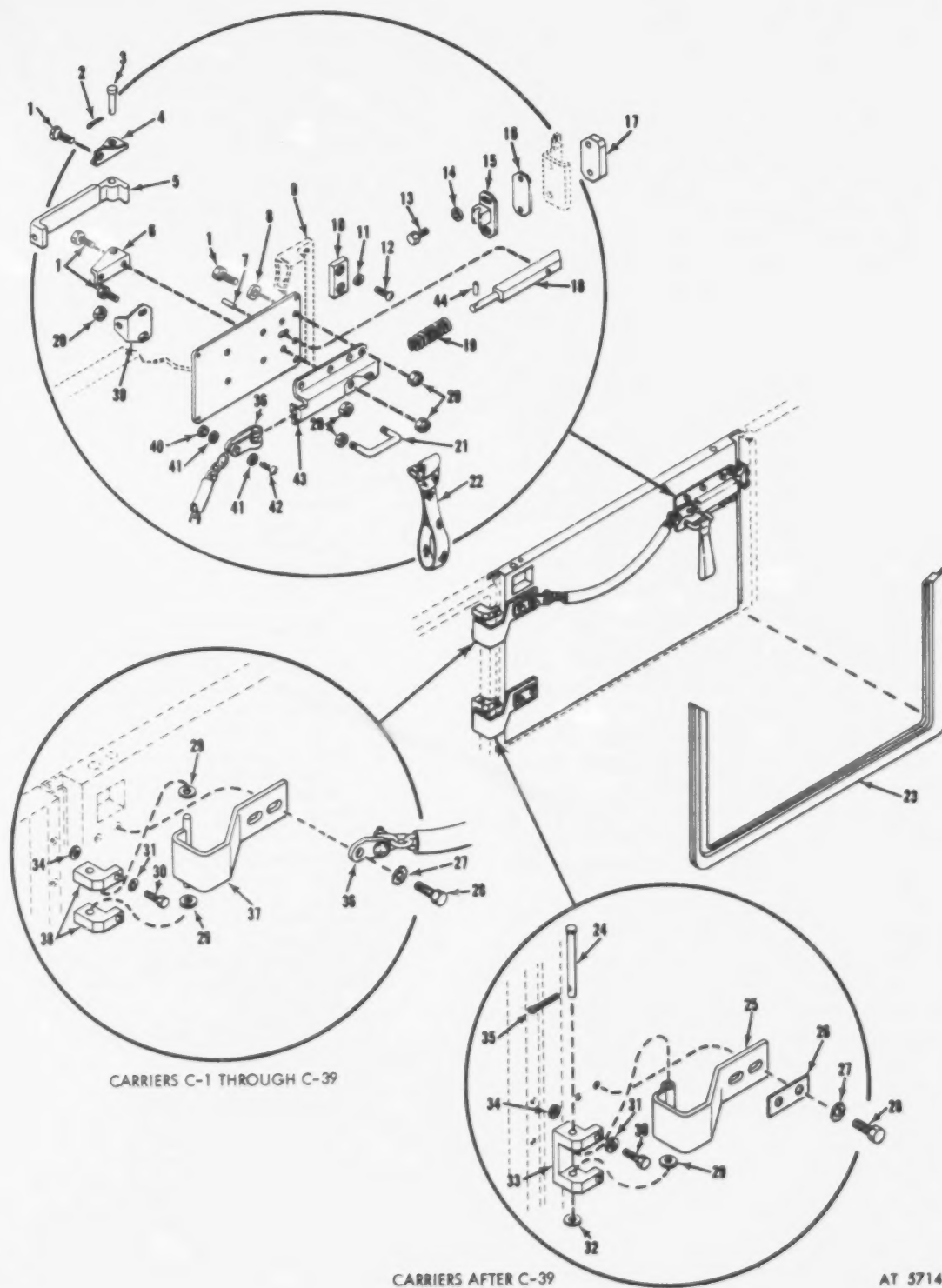


Figure 2-162. Cab doors, handles, linkage, and seals.

2-225. Cab Door Seal

(fig. 2-162)

a. Removal. Bend retaining strips from seal (23), and remove seal.

b. Inspection and Repair. Before removal, inspect seal for loss of resiliency, cracks, and breaks. Replace seal that shows any of these defects.

c. Installation.

(1) Position seal (23) on door (9), and secure by bending retaining strips over seal.

(2) To prevent water leakage during water operation, cement lower corners of seal (23) to door (9) as follows:

(a) Clean mating surfaces of door and seal thoroughly.

(b) Coat mating surfaces with adhesive MIL-A-5092.

(c) Allow adhesive to dry until tacky, and press surfaces together firmly.

2-226. Cab Door Window

(fig. 2-163)

NOTE

Left and right cab door windows are removed and installed in a similar manner.

a. Removal. Remove two screws (16) and washers (15) securing window frame (14) to cab door, and remove window frame.

b. Disassembly.

NOTE

Normally, complete disassembly of cab door windows is not necessary to perform a specific maintenance operation. Remove only those parts shown defective during inspection.

(1) Remove handle retainer pin (9) securing spring end of sliding window handle (8), and remove handle and handle spring (20) from sliding window bottom channel (22).

(2) Slide sliding window glass (6) to front, and remove four screws (10) securing rear glass run channel (21); return glass (6) to rear position, remove one screw (10), and remove glass (6), sliding window bottom channel (22), and channel (21).

(3) Remove four screws (19) securing front glass run channel (18), and remove channel.

(4) Remove two screws (13) and nuts (11) securing two fixed window retainers (12) to window frame (14), and remove retainers.

(5) Slide fixed window glass (3) toward rear, and remove glass, fixed window channel (2), and weatherstrip channel (5) as a unit from window frame (14).

(6) Remove sliding window bottom channel

(22) and sealing tape (23), top channel (4), rear channel (7), stop channel (1), fixed window channel (2), and weatherstrip channel (5) only when replacement is required.

(7) If required, remove window seal (17) and window-to-door seals (24, 25, and 26) from grooves in window frame (14).

c. Inspection and Repair.

(1) Before removal, inspect glass for cracks, chips, and broken condition. Replace glass that shows any of these defects.

(2) Before removal, inspect seals and channels for cracks, breaks, and deterioration. Replace parts that show any of these defects.

(3) Inspect window frame for cracks and distortion. Repair cracks. Replace frame that shows distortion.

d. Assembly.

(1) Install seals:

(a) Window seal: Clean grooves in window frame (14) and back of seal (17), apply a light coat of adhesive MIL-A-5092 to mating surfaces, and install seal.

(b) Window-to-door seal(s): Clean groove in window frame, and install seal(s).

(2) Install channels:

(a) Sliding window top channel, rear channel, and stop channel: Clean channel and groove in window frame (14), apply a light coat of adhesive MIL-A-5092 to mating surfaces, and install channel in window frame.

(b) Sliding window bottom channel: Clean sliding window glass (6), apply a strip of sealing tape (23) MIL-T-6841 (1/32-in. thick x 1 1/2-in. wide) centered lengthwise on bottom edge of glass, trim tape ends, and install sliding window bottom channel (22) on glass.

(c) Fixed window channel: Clean fixed window glass (3), and install channel.

(d) Weatherstrip channel: Clean rear edge of fixed window glass (3) and inside channel surfaces, apply a light coat of adhesive MIL-A-5092 to mating surfaces, and install channel on rear edge of glass.

(3) Slide fixed window glass (3) with fixed window channel (2) and weatherstrip channel (5) as a unit forward into groove in window frame (14).

NOTE

Weatherstrip channel (5) must be towards center of window.

(4) Position two fixed window retainers (12) on window frame (14), and secure with two screws (13) and nuts (11).

(5) Position front glass run channel (18) on window frame (14), and secure with four screws (19).

(6) Place sliding window glass (6) and bottom channel (22) as a unit into rear glass run channel (21), and position glass and two channels in window frame (14). Slide sliding window glass (6) to forward position, and secure channel (21) with four screws (10); return glass to rear position, and install one screw (10) in channel (21).

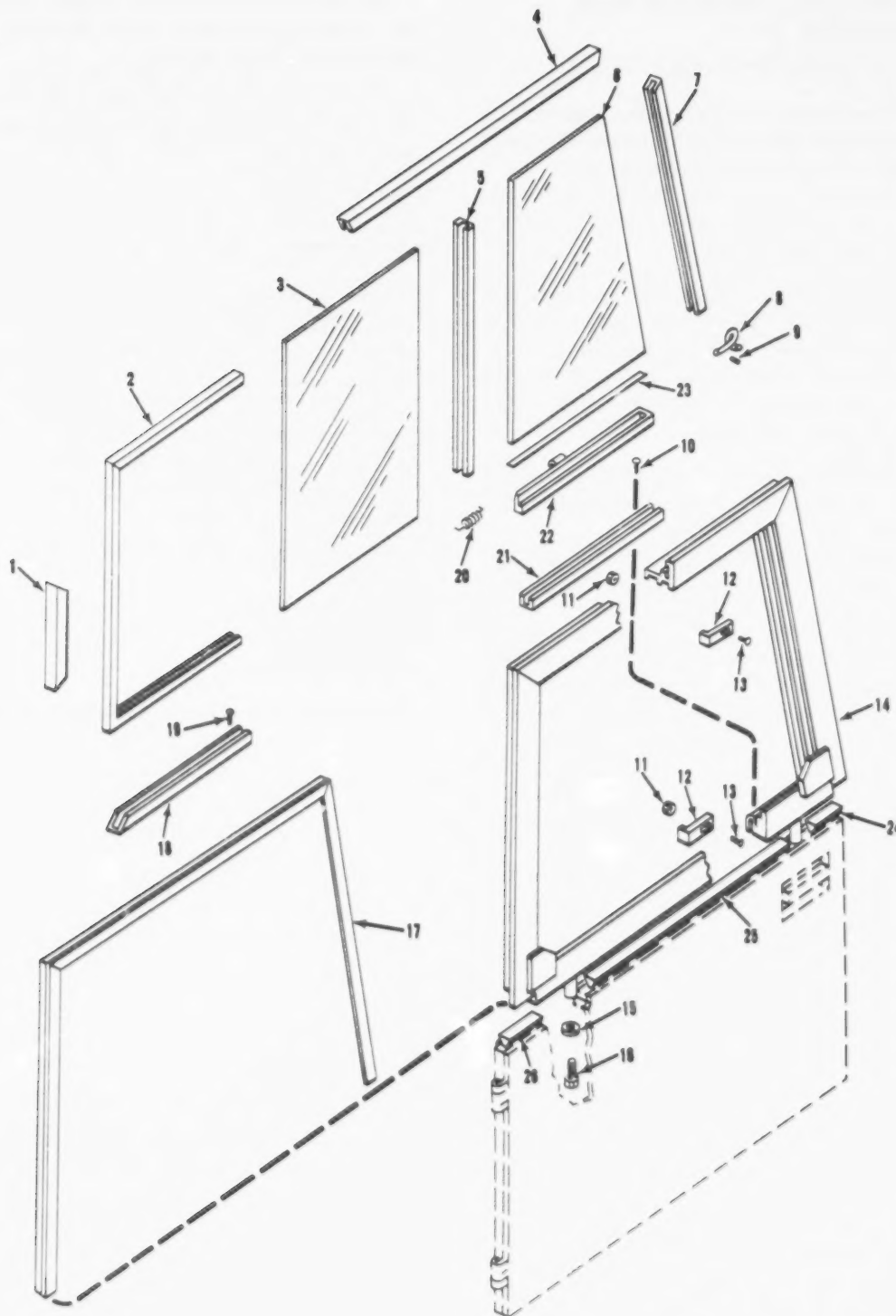
(7) Insert sliding window handle (8) through mounting tube on sliding window bottom channel (22), install handle spring (20) on handle, and secure with handle retainer pin (9).

e. Installation. Position window frame (14) on cab door, and secure with two screws (16) and washers (15).

LEGEND to fig. 2-163

- 1 Sliding window stop channel
- 2 Fixed window channel
- 3 Fixed window glass
- 4 Sliding window top channel

- 5 Weatherstrip channel
- 6 Sliding window glass
- 7 Sliding window rear channel
- 8 Sliding window handle
- 9 Handle retainer pin
- 10 Rear glass run channel screw
- 11 Fixed window retainer nut
- 12 Fixed window retainer
- 13 Fixed window retainer screw
- 14 Door window frame
- 15 Window-to-door flat washer
- 16 Window-to-door screw
- 17 Window seal
- 18 Front glass run channel
- 19 Front glass run channel screw
- 20 Handle spring
- 21 Rear glass run channel
- 22 Sliding window bottom channel
- 23 Sliding window sealing tape
- 24 Rear window-to-door seal
- 25 Inner window-to-door seal
- 26 Front window-to-door seal



AT 5715

Figure 2-163. Cab door window (left and right-left side shown) - exploded view.

2-227. Driver's and Personnel Seat Backrests

a. Driver's Seat Backrest (fig. 2-164)

(1) Removal.

(a) Remove four screws (13) and washers (12) securing backrest support (2) to frame (11), and remove support with bracket cushion (1).

(b) Remove 12 screws (5), 12 washers (4), and 4 brackets (3) securing backrest cushion (1) to support (2), and remove cushion.

(2) Inspection and repair.

(a) Inspect support for cracks and deformation. Straighten bent areas, and repair cracks. Replace support damaged beyond repair.

(b) Inspect cushion for tears, cuts, and excessive wear. Repair or replace cushion that shows any of these defects.

(3) Installation.

(a) Position backrest cushion (1) on support (2), and secure with 4 brackets (3), 12 washers (4), and 12 screws (5).

(b) Position support (2) with cushion (1) on frame (11), and secure with four washers (12) and screws (13).

b. Personnel Seat Backrest (fig. 2-165).

(1) Removal. Remove five screws (7) and washers (8) securing backrest (4) to hull, disengage ten retainers (9), and remove backrest.

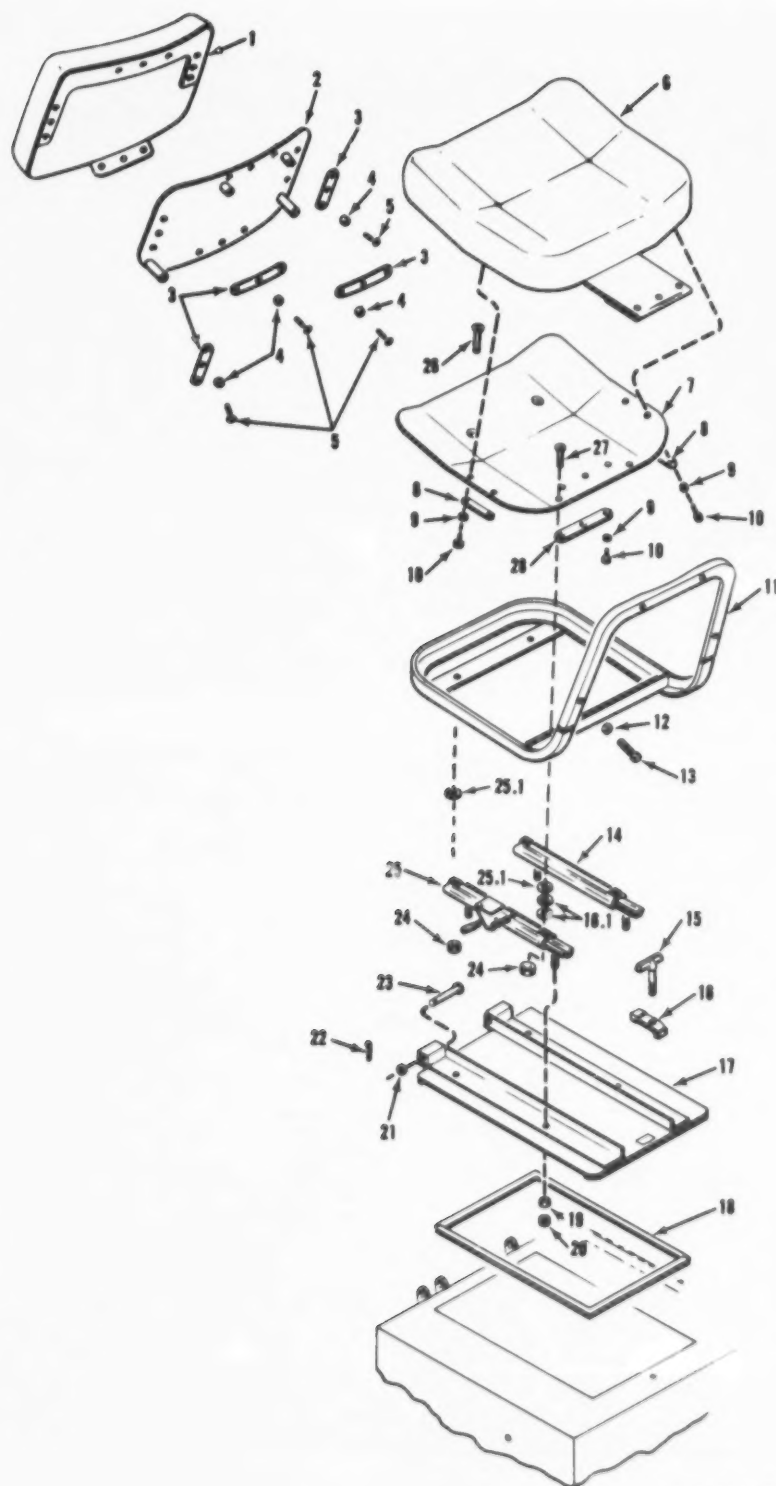
(2) Inspection and repair. Inspect backrest for tears, cuts, and excessive wear. Replace backrest that shows of these defects.

(3) Installation. Position backrest in cab, engage ten retainers (9), and secure five top retainers with five screws (7) and washers (8).

Legend to fig. 2-164.

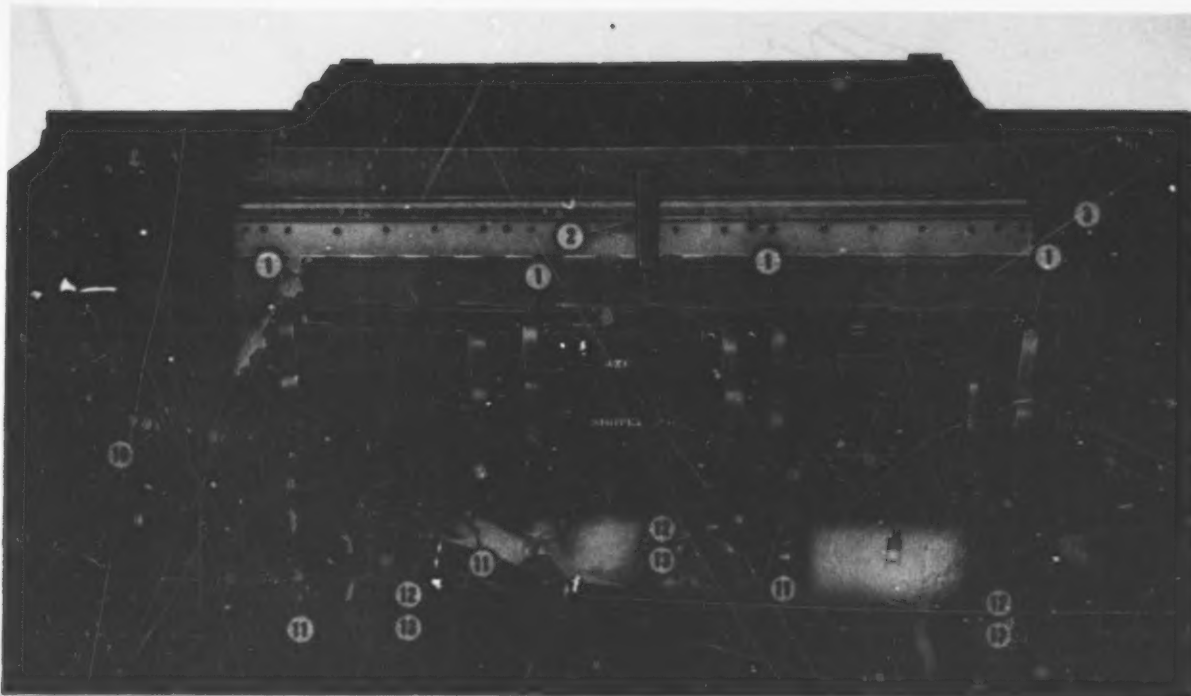
- 1 Backrest cushion
- 2 Backrest support
- 3 Backrest bracket
- 4 Bracket washer
- 5 Backrest screw
- 6 Cushion
- 7 Seat plate
- 8 Cushion side bracket
- 9 Cushion bracket washer
- 10 Cushion bracket screw
- 11 Frame
- 12 Backrest support washer
- 13 Backrest support screw
- 14 Right track assembly
- 15 Tee handle
- 16 Tee handle clamp
- 16.1 Washer
- 17 Battery compartment cover
- 18 Battery compartment seal
- 19 Track washer
- 20 Track nut
- 21 Cover washer
- 22 Cover cotter pin
- 23 Cover pin
- 24 Track nut
- 25 Left track assembly
- 25.1 Washer
- 26 Track front screw
- 27 Track rear screw
- 28 Cushion rear bracket.

Figure 2-164. Driver's seat - exploded view - continued.



TA 044154 ■

Figure 2-164. Driver's seat - exploded view.



A—SEAT BELTS AND CUSHION RETAINING STRAPS



B—PERSONNEL SEAT CUSHIONS

AT 3883

Figure 2-165. Personnel seats and safety belts.

Legend to fig. 2-165.

- 1 Cushion retaining strap
- 2 Seat retaining strap
- 3 Center seat
- 4 Personnel seat backrest
- 5 Center seat cushion
- 6 Right seat cushion
- 7 Cap screw
- 8 Flat washer
- 9 Seat retainer
- 10 Seat safety belt
- 11 Safety belt retaining cap screw
- 12 Safety belt retaining nut
- 13 Safety belt retaining washer

Figure 2-165. Personnel seats and safety belts - continued.

2-228. Driver's and Personnel Seat Cushions

a. Driver's Seat Cushion (fig. 2-164).

(1) *Removal.* Remove seven screws (10), seven washers (9), two side brackets (8), and one rear bracket (28) securing cushion (6) to seat plate (7), and remove cushion.

(2) *Inspection and repair.* Inspect cushion for tears, cuts, and excessive wear. Repair or replace cushion that shows any of these defects.

(3) *Installation.* Position cushion (6) on seat plate (7), and secure with one rear bracket (28), two side brackets (8), seven washers (9), and seven screws (10).

b. Personnel Seat Cushion (Center) (fig. 2-165).

(1) Removal.

(a) Release center seat strap (2) securing center seat (3) in normal position, and raise seat.

(b) Remove four straps (1) securing center seat cushion (5) to seat (3), and remove cushion.

(2) *Inspection and repair.* Inspect cushion for tears, cuts and excessive wear. Replace cushion that shows any of these defects.

(3) Installation.

(a) Thread four straps (1) through loops on back of cushion (5).

(b) Raise center seat (3), position cushion (5) on seat, and thread four straps (4) through seat.

(c) Secure four straps (1).

(d) Lower seat (3) to normal position and secure center seat strap (2).

c. Personnel Seat Cushion (Right) (fig. 2-166).

(1) Removal.

(a) Remove seat (para 2-229).

(b) Remove two straps (12) securing cushion (6, fig. 2-165) to seat, and remove cushion.

(c) Separate straps from cushion.

(2) *Inspection and repair.* Inspect cushion for tears, cuts, and excessive wear. Replace cushion that shows any of these defects.

(3) Installation.

(a) Thread two straps (12, fig. 2-166) through loops on cushion (6, fig. 2-165).

(b) Position cushion on seat, thread two straps (12, fig. 2-166) through seat, and secure.

(c) Install seat (para 2-229).

2-229. Driver's and Personnel Seats

a. Driver's Seat (fig. 2-164).

(1) Removal.

(a) Disengage tee handle (15) and clamp (161), and tilt seat forward.

(b) Remove four nuts (20) and washers (19) securing right track assembly (14) and left track assembly (25) to battery compartment cover (17), and remove seat.

(c) If inspection ((3) below) indicates replacement of battery compartment seal (18) is necessary, remove and discard seal.

(2) Disassembly.

(a) Remove backrest (para 2-227a).

(b) Remove seat cushion (para 2-228a).

(c) Slide lower portions of tracks (14 and 25) to rear for access to two front nuts (24). Remove two nuts (24), washers (25.1), and screws (26).

(d) Slide lower portions of tracks (14 and 25) to front for access to two rear nuts (24). Remove two nuts (24), washers (25.1), four washers (16.1), and two screws (27). Remove tracks (14 and 25) and seat plate (7) from frame (11).

(3) Inspection and repair.

(a) Inspect battery compartment seal for cracks, loss of resiliency, and deterioration. Replace seal that shows any of these defects.

(b) Inspect seat plate and frame for cracks and distortion. Straighten bent areas, and repair cracks. Replace plate or frame damaged beyond repair.

(c) Inspect tracks for excessive wear and binding. Replace tracks that show either of these defects.

(4) Assembly.

(a) Slide lower portion of tracks (14 and 25) to front. Position tracks (14 and 25) and seat plate (7) on frame (11). Secure with two rear screws (27), washers (25.1), four washers (16.1), and two nuts (24).

(b) Slide lower portion of tracks (14 and 25) to rear, and secure tracks to seat plate (7) and frame (11) with two front screws (26), washers (25.1), and nuts (24).

(c) Install seat cushion (para 2-228a).

(d) Install backrest (para 2-227a).

(5) *Installation.*

(a) If seal (18) was removed, clean mating surfaces, apply a light coat of adhesive MIL-A-5092 to one surface, allow to dry until tacky, and press seal firmly in place on battery compartment.

(b) Position seat tracks (14 and 25) on battery compartment cover (17), and secure with four washers (19) and nuts (20).

(c) Lower battery compartment cover (17), and secure with clamp (16) and tee handle (15).

b. *Personnel Seat (Center)* (fig. 2-166).

(1) *Removal.*

(a) Remove seat cushion (para 2-228b) and seat backrest (para 2-227b).

(b) Remove seat retaining strap (12) securing seat plate (8) in normal position.

(c) Remove 8 nuts (6), 16 washers (7), and 8 screws (5) securing seat plate (8) to transverse beam at hinge, and remove seat plate.

(d) If inspection ((2) below) indicates replacement of gaskets and seal is necessary, remove and discard side and front gaskets (9 and 11) and seat side seal (10).

(2) *Inspection and repair.*

(a) Inspect seat side seal and side and front gaskets for loss of resiliency, cracks, and deterioration. Replace seal or gaskets that show any of these defects.

(b) Inspect seat plate for cracks and distortion. Replace plate that shows either of these defects.

(3) *Installation.*

(a) If inspection ((2) above) indicates replacement of seal and gaskets is necessary, install new seal ((10) and new gaskets (9 and 11)) ((b) below).

(b) Clean mating surfaces of seat support and seal or gaskets thoroughly, apply a light coat of adhesive MIL-A-5092 to one surface, allow to dry until tacky, and press seal or gasket firmly in place.

(c) Position seat plate (8) on transverse

beam at hinge, and secure with 8 screws (5), 16 washers (7), and 8 nuts (6).

NOTE

Install washers under screw heads and under nuts. If seat plate does not rest evenly on supports when lowered, slot holes in hinge, and reposition plate.

(d) Lower seat plates (8) to normal position, and secure with seat retaining strap (12).

(e) Install seat backrest (para 2-227 b) and seat cushion (para 2-228 b).

c. *Personnel Seat (Right)* (fig. 2-166).

(1) *Removal.*

(a) Remove seven screws (1) and washers (2) securing right seat plate (3), with cushion attached, to seat support, and remove seat plate (3).

(b) Remove seat cushion from right seat plate (para 2-228 b).

(c) If inspection ((2) below) indicates replacement of gaskets is necessary, remove and discard gaskets (4, 13, and 14).

(2) *Inspection and repair.*

(a) Inspect gaskets for loss of resiliency, breaks and deterioration. Replace gaskets that show any of these defects.

(b) Inspect seat plate for cracks and distortion. Replace plate that shows either of these defects.

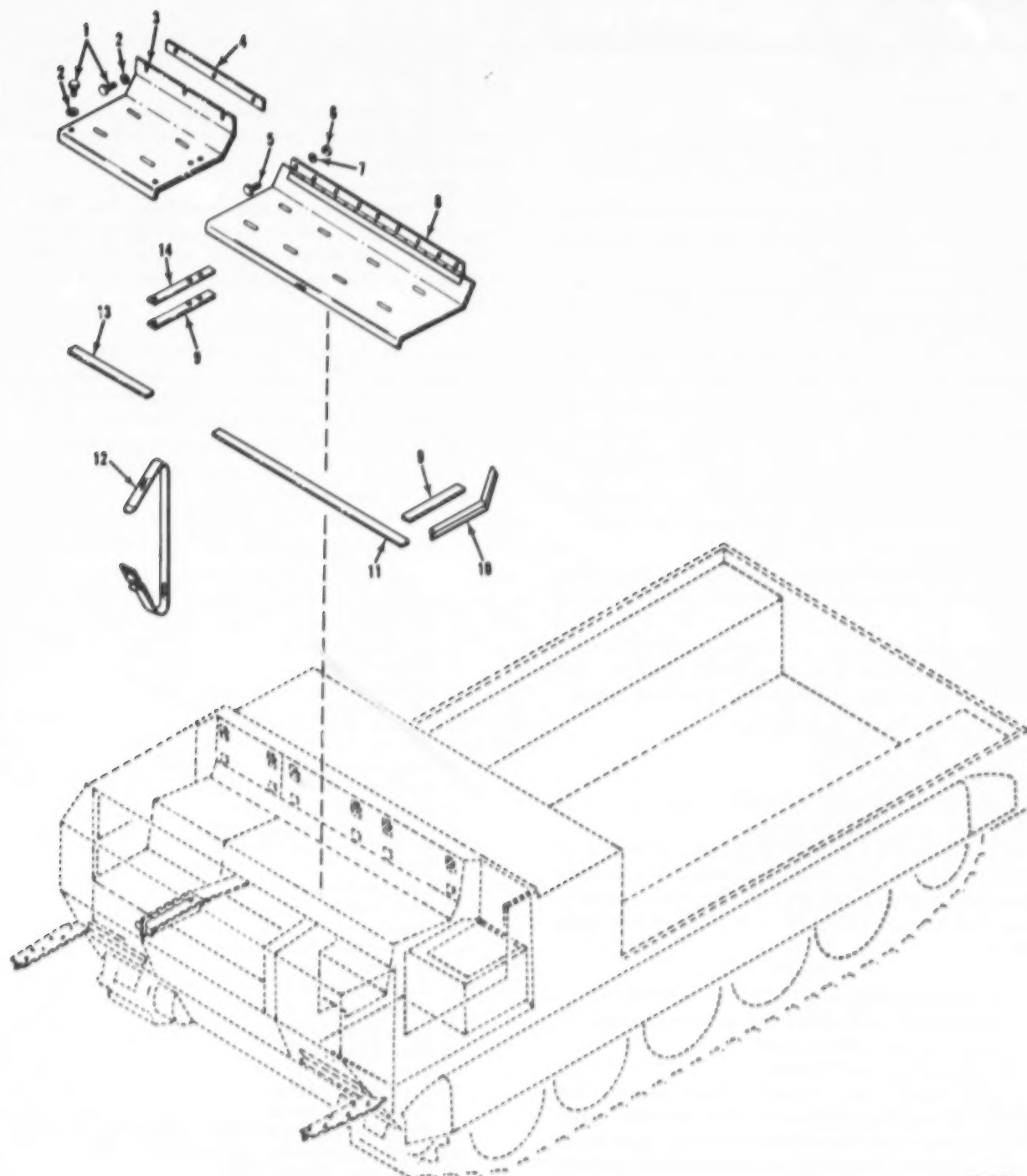
(3) *Installation.*

(a) If inspection ((2) above) indicates replacement of gaskets is necessary, install new gaskets (4, 13, and 14) ((b) below).

(b) Clean mating surfaces of seat plate and gaskets, apply a light coat of adhesive MIL-A-5092 to one surface, allow to dry until tacky, and press gasket firmly in place.

(c) Install seat cushion on right seat plate (para 2-228 b).

(d) Position right seat plate (3), with cushion attached, to seat support, and secure with seven screws (1) and washers (2).



AT 3884

- 1 Right seat screw
- 2 Right seat washer
- 3 Right seat plate
- 4 Right seat upper gasket

- 8 Center seat plate
- 9 Center seat side gasket
- 10 Center seat side seal

- 5 Center seat screw
- 6 Center seat nut
- 7 Center seat washer

- 11 Center seat front gasket
- 12 Center seat retaining strap
- 13 Right seat front gasket
- 14 Right seat side gasket

Figure 2-166. Personnel seats—exploded view.

2-230. Driver's and Personnel Seat Safety Belts (fig. 2-165)

a. Removal.

NOTE

Removal is similar for all seat safety belts. Omit (1) below for driver's seat and right personnel seat.

(1) Release retaining strap (2) securing center seat in normal position, raise seat, and secure to blast cover with strap.

(2) Remove nut (12), washer (13), and screw (11) securing seat safety belt (10) to seat plate, and remove safety belt.

b. *Inspection and Repair.* Inspect seat safety belts for damaged buckles and plates, and frayed, torn, and excessively worn belts. Replace safety belt that shows any of these defects.

c. Installation.

NOTE

Installation is similar for all seat safety belts. Omit (2) below for driver's and right personnel seat.

(1) Position seat safety belt (10) to seat plate, and secure with screw (11), washer (13), and nut (12).

(2) Release strap (2) securing center seat to blast cover, lower seat to normal position, and secure seat to seat support with retaining strap.

2-231. Cab Cover and Frame

(fig. 2-167)

a. Removal.

(1) Refer to TM 9-1450-585-10 for removal of cab cover and window frames.

(2) Remove 8 screws (37), nuts (23), spacers (36), grommets (25), and 16 washers (24) securing front mount (20) to windshield, and remove mount, front mount seal (22), and two front mount pads (21).

NOTE

If front mount seal (22) is secured to windshield with adhesive or screws and nuts, do not remove seal.

b. Inspection and Repair.

(1) Inspect bow, frames, front mount, and panels for cracks, deformation, and excessive wear. Inspect frames for damaged or missing snap studs. Inspect panels for broken or missing seal retainers and rope hooks. Repair parts that show minor cracks and deformation. Replace damaged or missing snap studs and seal retainers. Replace parts damaged beyond repair.

(2) Inspect cab cover for tears, loose or broken seams, damaged or missing grommets and snaps, and torn, discolored, or missing windows. Replace cover that shows any of these defects.

(3) Inspect tie-down rope for broken or frayed strands. Replace rope that shows either of these defects.

(4) Inspect seals, grommets, and pads for cracks, breaks, and deterioration. Replace parts that show any of these defects.

c. Installation.

(1) Position front mount seal (22), two front mount pads (21), and front mount (20) to top of windshield, and secure with 8 screws (37), nuts (23), spacers (36), grommets (25), and 16 washers (24).

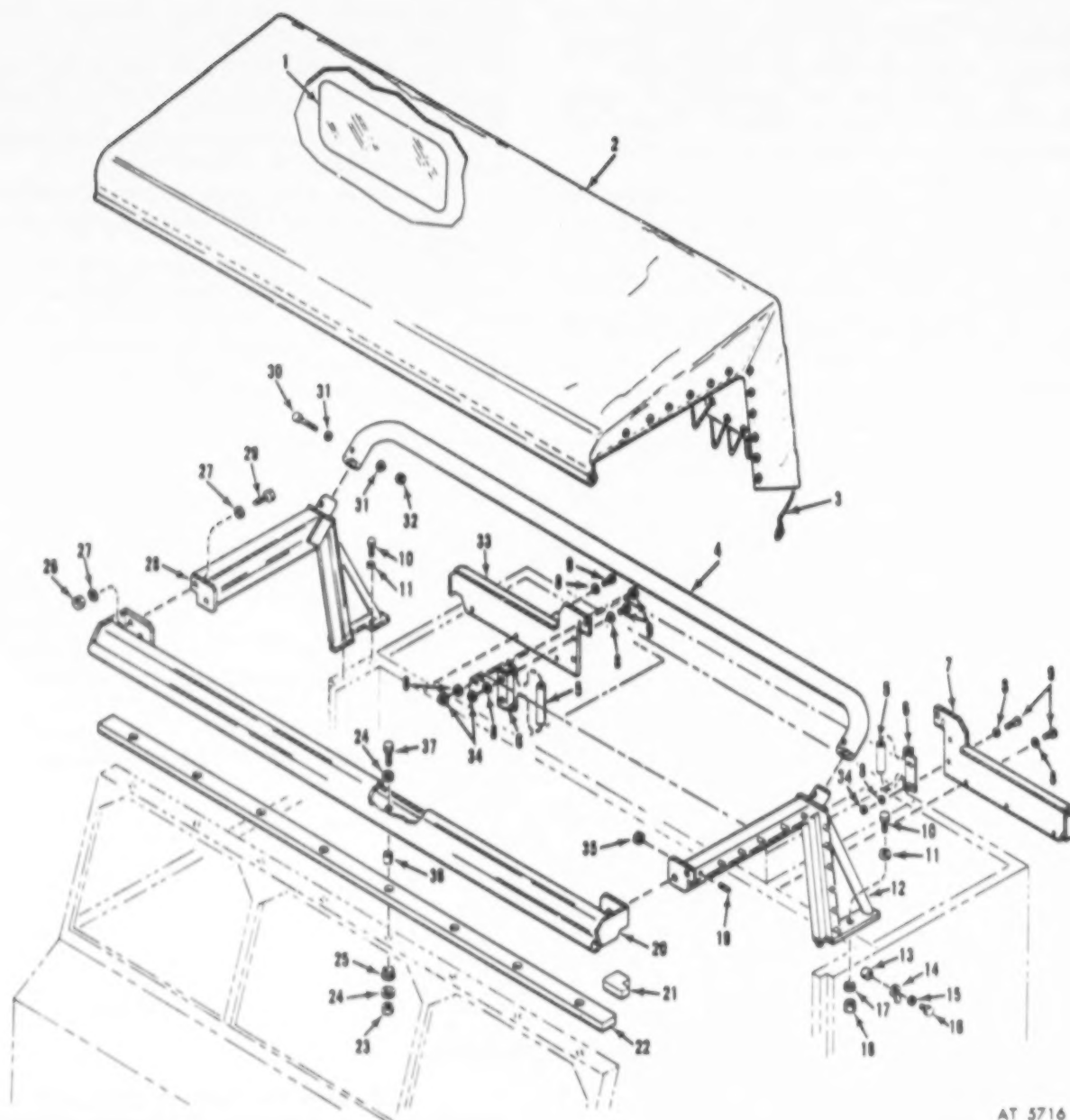
NOTE

Front mount seal (22) may be secured to windshield with adhesive or screw and nuts. If seal is loose, clean mating surfaces of seal and windshield, apply light coat of adhesive MIL-A-5092 to one surface, allow to dry until tacky, and press seal firmly in place on windshield.

(2) Refer to TM 9-1450-585-10 for installation of cab cover and window frames.

LEGEND to fig. 2-167

- 1 Cab cover window
- 2 Cab cover assembly
- 3 Tie-down rope
- 4 Cab frame bow
- 5 Rear panel seal
- 6 Rear panel rear retainer
- 7 Left rear panel
- 8 Rear panel washer
- 9 Rear panel screw
- 10 Door window frame screw
- 11 Door window frame washer
- 12 Left door window frame
- 13 Hook nut
- 14 Lacing hook
- 15 Hook washer
- 16 Hook screw
- 17 Door window frame spacer
- 18 Door window frame nut
- 19 Snap fastener stud
- 20 Cab cover front mount
- 21 Front mount rubber pad
- 22 Front mount seal
- 23 Front mount nut
- 24 Front mount washer
- 25 Front mount grommet
- 26 Front mount-to-door window frame nut
- 27 Front mount-to-door window frame washer
- 28 Right door window frame
- 29 Front mount-to-door window frame screw
- 30 Bow screw
- 31 Bow washer
- 32 Bow nut
- 33 Right rear panel
- 34 Rear panel nut
- 35 Snap fastener stud nut
- 36 Front mount spacer
- 37 Front mount screw



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Figure 2-167. Cab cover and frame—exploded view.

2-232. Windshield (fig. 2-168)**a. Removal.**

- (1) Remove cab cover (TM 9-1450-585-10).
- (2) Remove cab cover front mount (para 2-231).
- (3) Remove three locknuts securing three windshield wiper arms to three pivots, and remove wiper arms (para 2-255).

- (4) Remove left and right windshield defrosters (para 3-11).

- (5) Remove eight screws, washers, grommets, and spacer securing windshield to hull, and remove windshield and seal (if loose). Discard grommets.

- (6) If top and bottom seals are secured to windshield, remove ten screws and nuts securing seals to windshield, and remove seals.

b. Inspection and Repair.

(1) Inspect windshield for cracks and distortion. Repair minor cracks and distortions. Replace windshield damaged beyond repair.

(2) Inspect seals and grommets for cracks, deterioration, and broken condition. Replace seals and grommets that show any of these defects.

c. Installation.

(1) Clean mating surfaces of windshield and top and bottom seals, apply light coat of adhesive MIL-A-5092 to one surface, allow to dry until tacky, and position seals on top and bottom of windshield.

(2) If seal and windshield are drilled for

screws, secure seals to windshield with ten screws and nuts. Tighten nuts until screw heads are 1/16 inch below surface of seals.

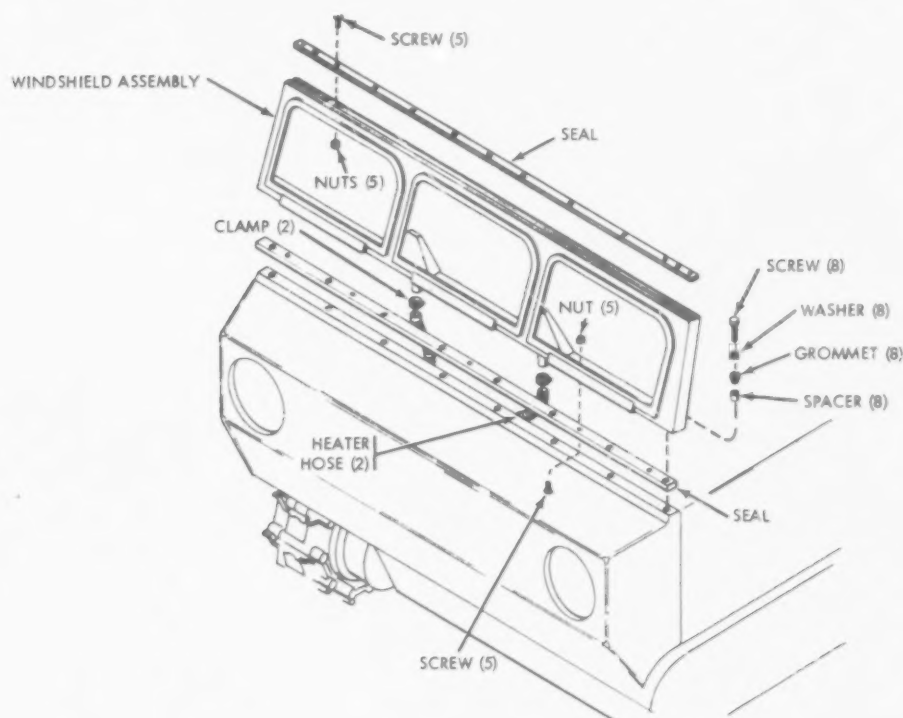
(3) Position windshield with seals on hull, and secure with eight spacers, new grommets, washers, and screws.

(4) Install left and right windshield defroster ducts (para 3-11).

(5) Position three windshield wiper arms on pivots, secure with three locknuts, and adjust wiper arms (para 2-253).

(6) Install cab cover mount (para 2-231).

(7) Install cab cover (TM 9-1450-585-10).



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Figure 2-168. Windshield.

2-233. Windshield Glass
(fig. 2-169)

NOTE

Left side, center, and right side windshield windows are removed and installed in a similar manner.

a. Removal.

(1) Remove windshield window frame and fastener.

(a) Carriers C-1 through C-38:

1. Disengage two stud fasteners (6) securing window frame (5) to windshield (1), and remove window frame.

2. Remove two outer retaining pins (4), grommets (9), washers (8), and inner retaining pins (13) securing two stud fasteners (6) to windshield (1), and remove fasteners.

(b) Carriers after C-38:

1. Disengage two clamp bolts (2) securing window frame (5) to windshield (1), and remove window frame (5).

2. Remove two retaining pins (4) and washers (3) securing two clamp bolts (2) to windshield window frame (5), and remove bolts.

(2) Remove upper filler seal (18) and lower

filler seal (19) securing upper glass seal (15) and lower glass seal (16) to window frame (5).

(3) Press windshield window glass (17) out of upper glass seal (15) and lower glass seal (16), and remove glass.

(4) Remove upper glass seal (15) and lower glass seal (16) from window frame (5).

(5) Remove bumper strip(s) (14) secured to windshield (1).

NOTE

Carriers C-1 through C-38 have three bumper strips, one for each window; carriers after C-38 have one bumper strip for all three windows.

b. Inspection and Repair.

(1) Inspect window glass for cracks, breaks, and discolorations. Replace glass that shows any of these defects.

(2) Inspect glass seals, filler seals, grommets, and bumper strip(s) for cracks, worn areas, and deterioration. Replace seals, strip(s), and grommets that show any of these defects.

(3) Inspect clamp bolts or stud fasteners for distortion, cracks, and damaged retaining pins or threads. Replace bolts or fasteners that show any of these defects.

c. Installation.

(1) *Install bumper strip (s):*

NOTE

Carriers C-1 through C-38 have three bumper strips, one for each window;

carriers after C-38 have one bumper strip for all three windows.

(a) Clean mounting surfaces of windshield frame (1) and bumper strip (s) (14).

(b) Apply a light coat of adhesive MIL-A-5092 to mating surfaces, and install strip on windshield frame.

(2) Install upper glass seal (15) and lower glass seal (16) in window frame (5).

(3) Press windshield window glass (17) into upper glass seal (15) and lower glass seal (16).

(4) Install upper filler seal (18) and lower filler seal (19) to secure upper glass seal (15) and lower glass seal (16) in window frame (5).

(5) Install windshield window frame and fastener.

(a) Carriers C-1 through C-38:

1. Position two stud fasteners (6) on windshield (1), and secure with two inner retaining pins (13), grommets (9), washers (8), and outer retaining pins (7).

2. Position windshield window frame (5) on windshield (1), and secure with two stud fasteners (6).

(b) Carriers after C-38:

1. Position two clamp bolts (2) on windshield window frame (5), and secure with two washers (3) and retaining pins (4).

2. Position windshield window frame (5) on windshield (1), and secure with two clamp bolts (2).

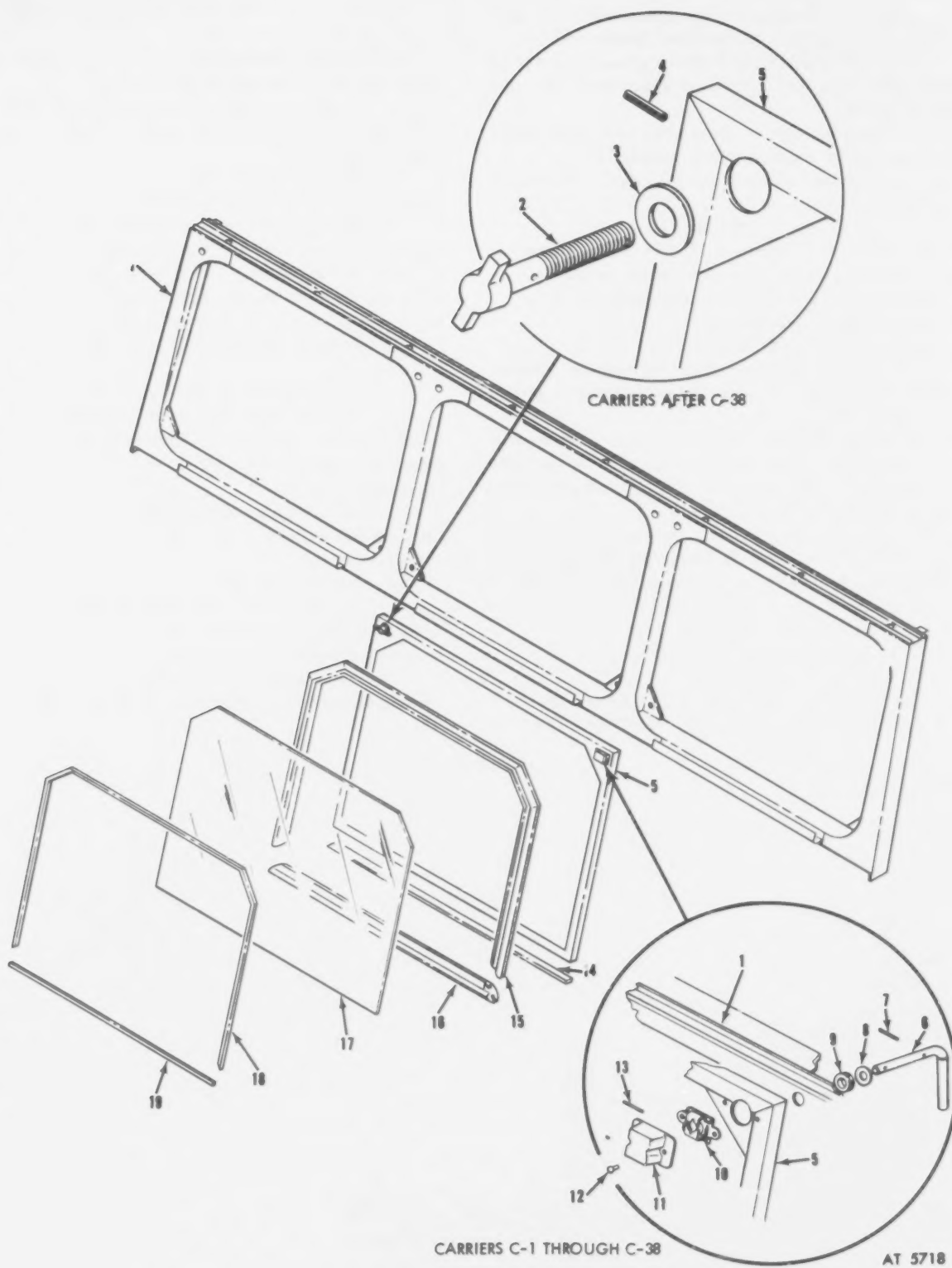


Figure 2-169. Windshield—exploded view.

LEGEND to fig. 2-169

- 1 Windshield
- 2 Clamp bolts
- 3 Clamp bolt washer
- 4 Clamp bolt retaining pin
- 5 Windshield window frame
- 6 Stud fastener
- 7 Stud fastener outer retaining pin
- 8 Stud fastener washer
- 9 Stud fastener grommet
- 10 Stud fastener retainer
- 11 Stud fastener retainer cover
- 12 Stud fastener retainer cover rivet
- 13 Stud fastener inner retaining pin
- 14 Bumper strip
- 15 Upper glass seal
- 16 Lower glass seal
- 17 Windshield window glass
- 18 Upper filler seal
- 19 Lower filler seal

2-234. Towing Eyes

(fig. 2-170)

a. Removal.

- (1) Remove spring clip securing towing eye pin, and remove pin and towing eye hook.
- (2) Remove six screws, and remove towing eye.

NOTE

Figure 2-170 shows towing eye mounted on front of carrier. Rear mounting is similar.

b. Inspection and Repair.

- (1) Inspect clip for excessive wear and loss of tension. Replace clip that shows either of these defects.
- (2) Inspect pin for excessive wear and broken condition. Replace pin that shows either of these defects.
- (3) Inspect hook and eye for cracks and elongation of holes. Replace parts that show either of these defects.

c. Installation.

- (1) Position towing eye on hull, and secure with six screws. Tighten screws to 130 to 140 pound-feet torque.
- (2) Position towing eye hook on towing eye, install towing eye pin, and secure pin with spring clip.

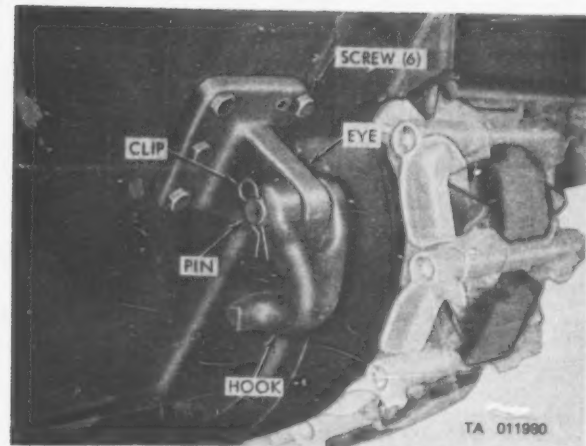


Figure 2-170. Towing eyes (typical).

2-235. Towing Pintle

a. Removal (fig. 2-171).

- (1) Remove and discard cotter pin securing pintle nut.
- (2) Remove nut and flat washer securing pintle to tailgate, and remove pintle, recessed washer, and packing from tailgate. Discard packing.

b. Disassembly (fig. 2-172).

- (1) Remove retaining ring (5) securing hook lock pin (6) in pintle lock (9) and pintle hook (7), and remove lock pin from hook.
- (2) Remove retaining ring (8) securing hook pin (3) and pintle latch (1) in pintle lock (9), and remove pin (3), latch (1), and latch spring (10) from pintle lock.
- (3) Remove lubrication fitting (2) from hook pin (3) and lubrication fitting (4) from lock pin (6).

c. Inspection and Repair.

- (1) Inspect retaining rings for nicks, distortion, and excessive wear. Replace rings that show any of these defects. Retaining rings must snap into retaining groove for proper operation.
- (2) Inspect pins for excessive wear. Replace pins that show excessive wear.

(3) Inspect hook for excessive wear and damaged threads. Replace hook that shows either of these defects.

(4) Inspect lock and latch for cracks and elongation of holes. Replace parts that show either of these defects.

(5) Inspect spring for loss of tension and broken condition. Replace spring that shows either of these defects.

d. Assembly (fig. 2-172).

(1) Install lubrication fitting (4) in lock pin (6) and lubrication fitting (2) in hook pin (3).

(2) Position latch spring (10), pintle latch (1), and hook pin (3) in pintle lock (9), and secure pin (3) with retaining ring (8).

(3) Position pintle lock (9) on pintle hook (7), align holes, insert lock pin (6), and secure lock pin (6) with retaining ring (5).

(4) Lubricate two lubrication fittings (LO 9-1450-585-12).

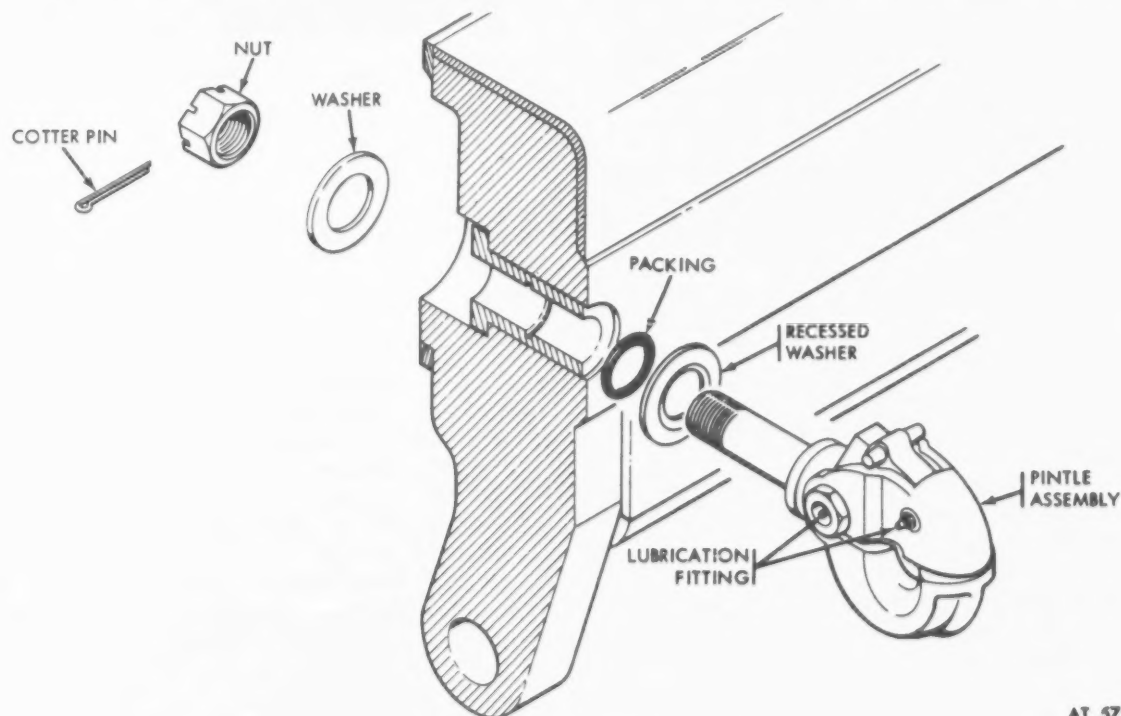
e. Installation (fig. 2-171).

(1) Install new packing in groove in tailgate.

(2) Position recessed washer on pintle, and carefully insert pintle through tailgate mounting hole.

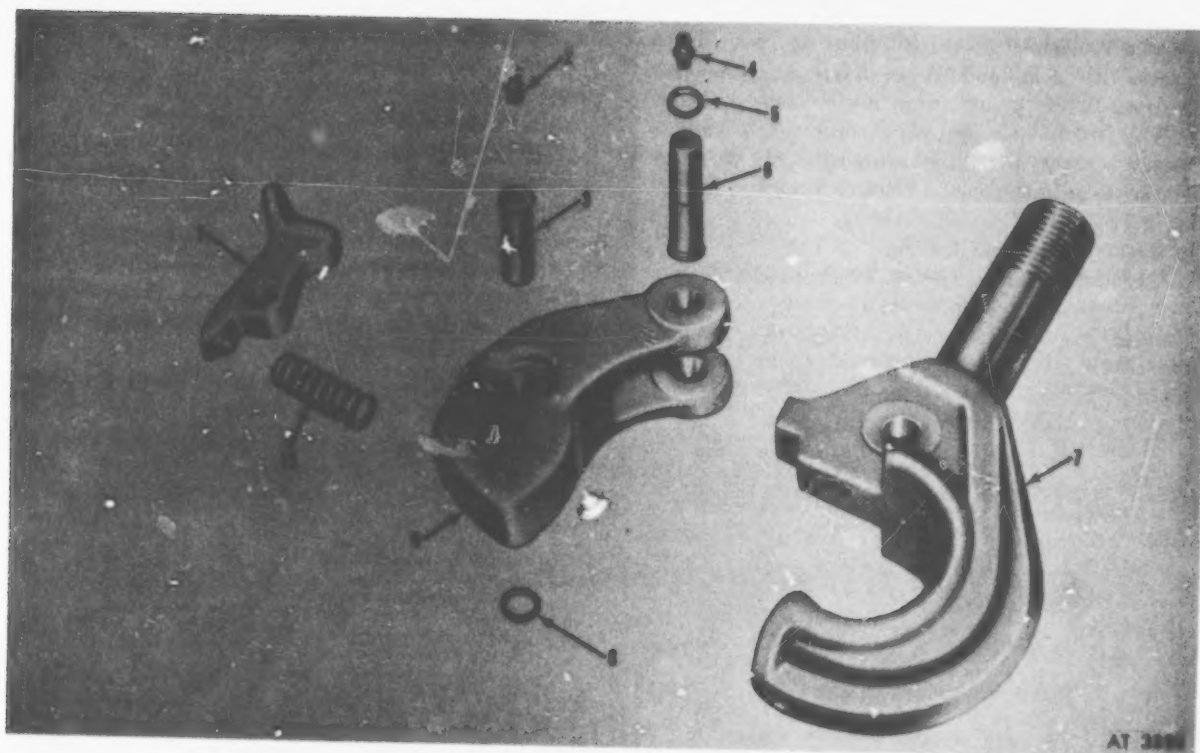
(3) Install flat washers as required on pintle, and secure pintle with pintle nut. Tighten nut until pintle cannot be rotated by hand, and back off nut one castellation.

(4) Install new cotter pin to secure pintle nut.



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Figure 2-171. Towing pintle—exploded cutaway view.



- 1 Pintle latch
- 2 Lubrication fitting
- 3 Hook pin
- 4 Lubrication fitting
- 5 Retaining ring

- 6 Hook lock pin
- 7 Pintle hook
- 8 Retaining ring
- 9 Pintle lock
- 10 Latch spring

Figure 2-172. Towing pintle—exploded view.

2-236. Lifting Eyes (fig. 2-173)

a. Removal. Remove four screws securing lifting eye to hull, and remove lifting eye.

b. Inspection and Repair.

(1) Inspect lifting eye for cracks and broken condition. Replace lifting eye that shows either of these defects.

(2) Inspect threaded parts for burred or damaged threads. Remove burs. Replace parts that have damaged threads.

c. Installation. Position lifting eye to hull, and secure with four screws. Tighten screw to 175 to 200 pound-feet torque.

d. Stowage. Stow two rear lifting eyes on hull cross beam at rear of engine compartment when missile launching equipment is installed.

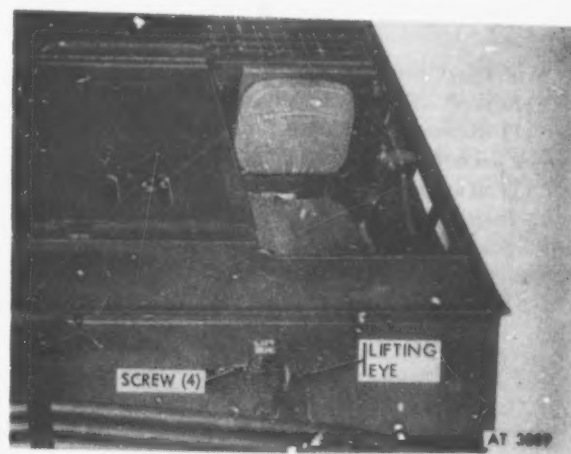


Figure 2-173. Lifting eyes (typical).

2-237. Blast Cover Over-Center Fasteners

(fig. 2-174)

a. Adjustment.

(1) Loosen two nuts securing over-center fastener to hull, and place fastener in locked position.

(2) Mark location of fastener, and release fastener.

(3) Lower fastener 7/64 to 9/64 inch, and secure two nuts.

b. Removal.

(1) Release over-center fastener.

(2) Remove two nuts, four washers, and two screws securing fastener to hull, and remove fastener.

c. *Inspection and Repair.* Inspect over-center fastener for bends, breaks, and distortion. Replace fastener that shows any of these defects.

d. Installation.

(1) Position over-center fastener on hull, and temporarily attach with two screws, four washers, and two nuts.

(2) Adjust over-center fastener (a above).

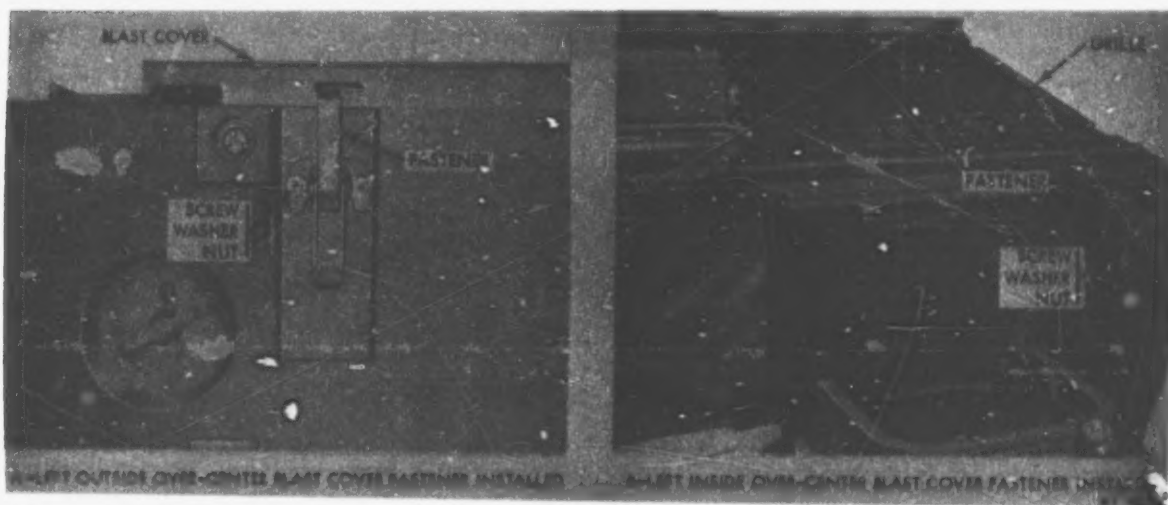


Figure 2-174. Blast cover over-center fasteners.

2-238. Blast Cover Bolt Fastener

(fig. 2-175)

a. Removal.

NOTE

All four blast cover bolt fasteners are removed in a similar manner.

(1) Remove two nuts, four washers, and two screws securing blast cover bolt fastener to hull.

(2) Remove bolt fastener and shim(s).

b. *Inspection and Repair.* Inspect blast cover bolt fastener for bends, cracks, and deformation. Replace fastener that shows any of these defects.

c. Installation.

NOTE

All four blast cover bolt fasteners are installed in a similar manner.

(1) Position blast cover bolt fastener on hull, and temporarily attach with two screws, four washers, and two nuts.

(2) Install shim(s) as required to obtain at least 50 percent engagement of latch on blast cover lug, and secure two nuts.

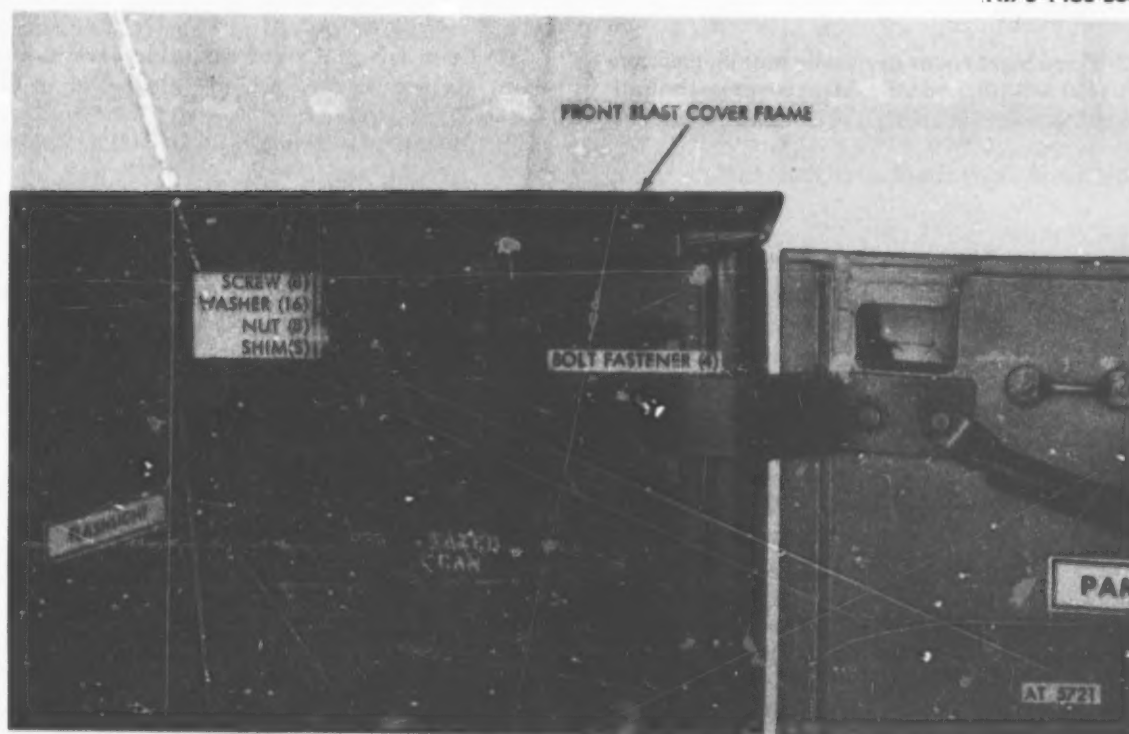


Figure 2-175. Blast cover bolt fastener (typical).

2-239. Blast Cover

a. Blast Cover Removal (fig. 2-176).

(1) Place blast cover in stowed position (TM 9-1450-585-10).

(2) Remove power plant intake and exhaust grilles (para 2-221). Remove six screws and washers securing blast cover to hull, and remove blast cover.

(3) If blast cover is being replaced, remove four screws and washers securing hand tool stowage container to bottom of rear center blast cover, and remove container.

b. Blast Cover Support Channel Removal (fig. 2-177).

(1) Remove two screws and washers securing support channel to top of seat plenum.

Note. Deleted.

(2) Remove four screws, eight washers, and four nuts securing support channel to transverse beam, and remove support channel.

c. Front Blast Cover Frame Removal (fig. 2-175). Refer to TM 9-1450-585-10.

d. *Inspection and Repair.* Inspect blast cover, support channel, and front frame for cracks, dents, distortion, damaged hinges and fasteners. Repair minor cracks and distortions. Refer to direct support maintenance personnel for parts damaged beyond repair.

e. Front Blast Cover Frame Installation (fig. 2-175). Refer to TM 9-1450-585-10.

f. Blast Cover Support Channel Installation (fig. 2-177).

(1) Position channel to transverse beam and seat plenum, and secure to transverse beam with four screws, eight washers, and four nuts.

(2) Install two nuts and washers in support channel, and secure channel to top of seat plenum.

g. Blast Cover Installation (fig. 2-176).

(1) If new blast cover is being installed, position hand tool stowage container to bottom of rear center blast cover, and secure with four screws and washers.

(2) Position blast cover in stowed position on hull (TM 9-1450-585-10), and through power plant intake and exhaust compartments install six screws and washers, but do not secure.

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(3) Place blast cover in missile launch position (TM 9-1450-585-10), and align blast cover so that all fasteners engage properly. If necessary, adjust fasteners (para 2-237).

(4) Locate lip on rear blast covers to clear lip on hull by 1/64 inch minimum, and align side covers parallel with edges of hull.

(5) Open left and right rear side covers, and secure six screws and washers (installed in (2) above).

(6) Install power plant intake and exhaust grilles (para 2-221).

(7) Place blast cover in stowed position, and remove front blast cover frame (TM 9-1450-585-10).



Figure 2-176. Blast cover - cutaway view.

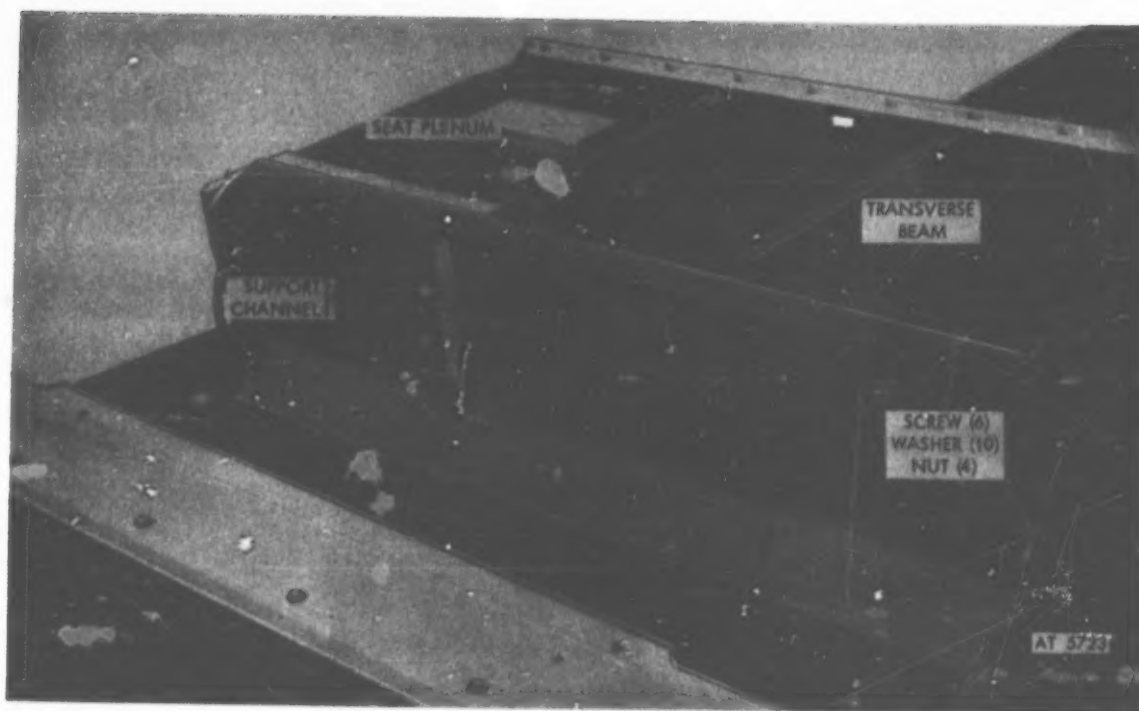


Figure 2-177. Blast cover support channel.

2-240. Rear Compartment Blast Shield (fig. 2-178)

a. Removal.

(1) Support blast shield with suitable lifting device.

(2) Remove five screws and washers securing blast shield to hull, and remove blast shield.

b. *Inspection and Repair.* Inspect blast shield for cracks, elongation of holes, and distortion. Weld minor cracks. Replace blast shield that is cracked

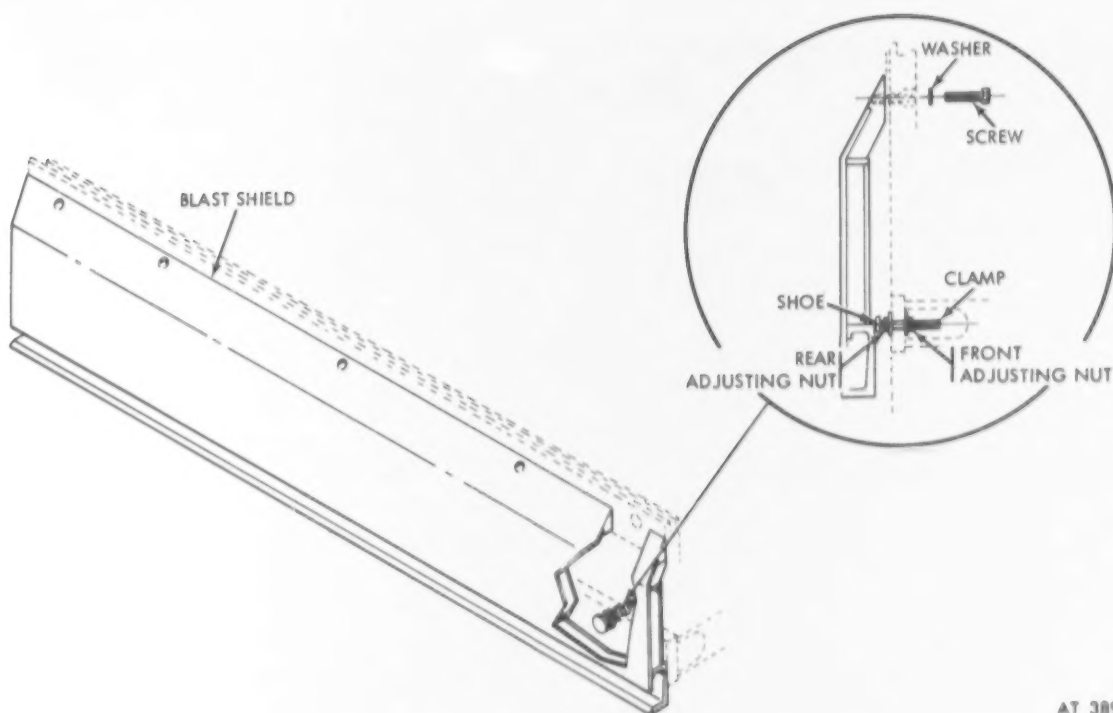
beyond repair or that shows either of the other defects.

c. Installation.

(1) Support blast shield with suitable lifting device, position shield to hull, and secure with five screws and washers.

(2) Remove lifting device.

(3) Loosen adjusting screw nuts, turn adjusting clamp until shoe is tight against blast shield, and secure adjusting screw nuts.



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Figure 2-178. Rear compartment blast shield.

Section XXVI. WINCH AND POWER TAKEOFF

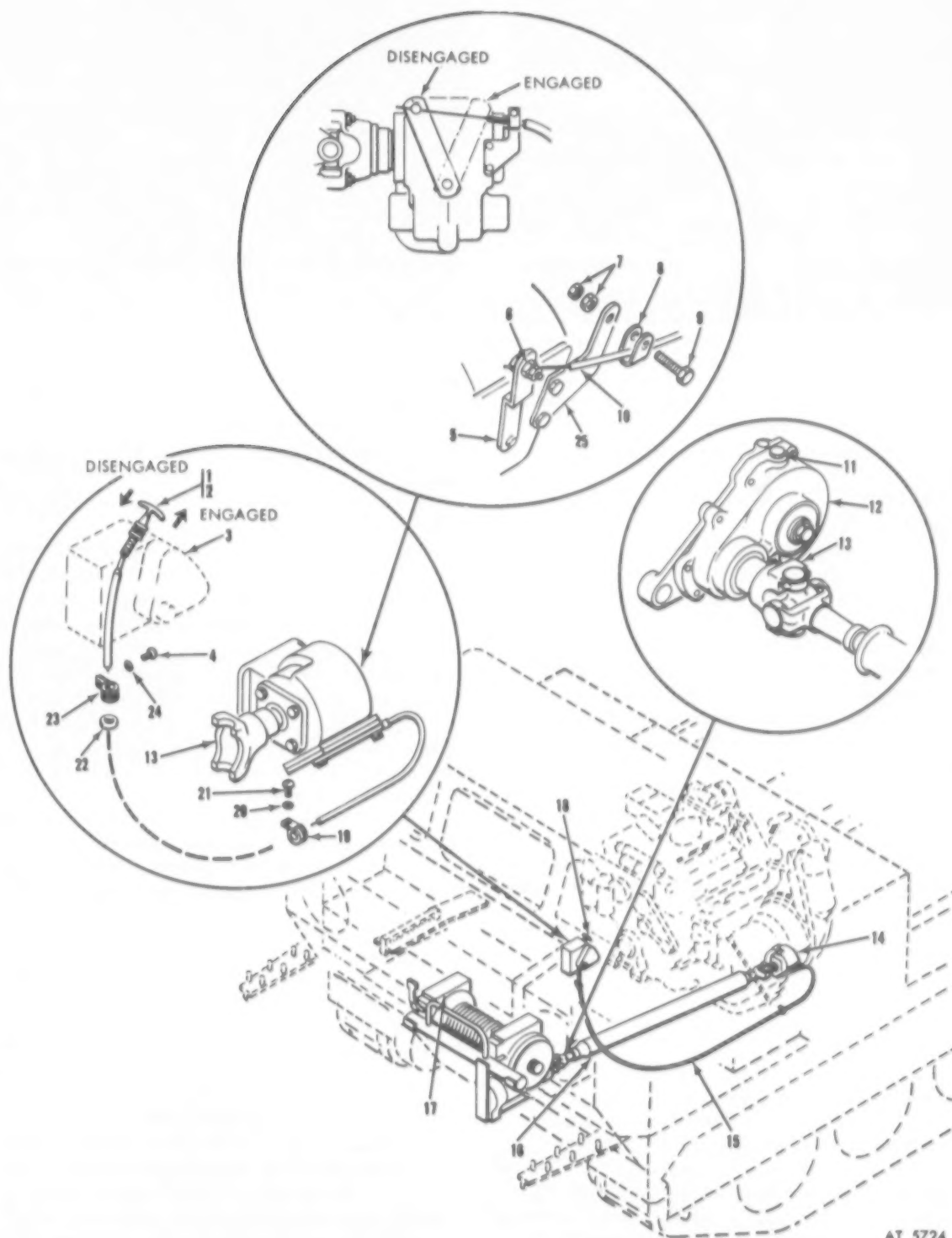
2-241. General

a. *Scope.* This section contains instructions for removal, inspection and repair, adjustment, and installation of the winch and power takeoff.

b. *Description.* The winch (fig. 2-179), used for recovery purposes, is mounted in a cavity in the front on the carrier. Four screws installed from the front of the carrier and four from the power plant compartment secure the winch, winch guard, and winch support to the carrier. A winch transfer gearcase, mounted in the power plant compartment, is driven by a power takeoff, mounted on the transmission and connected to the transfer gearcase by a propeller shaft and two yoke assemblies. A shear pin in the yoke attaching the propeller shaft to the transfer gearcase prevents overloading the winch. The winch is equipped with an automatic safety brake on the worm shaft and a drag brake that prevents the drum from overrunning the cable as the cable is paid out. Both brakes are adjustable.

LEGEND to fig. 2-179

- 1 Power takeoff push-pull control nut
- 2 Power takeoff push-pull control internal-toothed lock washer
- 3 Gear selector housing
- 4 Power takeoff push-pull control machine screw
- 5 Power takeoff actuating lever
- 6 Actuating lever setscrew
- 7 Power takeoff push-pull control clamp nut
- 8 Power takeoff push-pull control clamp
- 9 Power takeoff push-pull control cap screw
- 10 Power takeoff push-pull control casing
- 11 Winch transfer gearcase breather
- 12 Winch transfer gearcase assembly
- 13 Propeller shaft yoke
- 14 Power takeoff assembly
- 15 Power takeoff push-pull control assembly
- 16 Winch propeller drive shaft assembly
- 17 Towing winch assembly
- 18 Power takeoff push-pull control handle
- 19 Power takeoff push-pull control loop clamp
- 20 Power takeoff push-pull control loop clamp washer
- 21 Power takeoff push-pull control loop clamp machine screw
- 22 Power takeoff push-pull control grommet
- 23 Power takeoff push-pull control clamp
- 24 Power takeoff push-pull control internal-toothed lock washer
- 25 Power takeoff push-pull control bracket



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Figure 2-179. Winch, propeller shaft, transfer gearcase, power takeoff, and power takeoff control.

c. *Torque Wrench Specifications.* Refer to table 2-27 for torque tightness readings for the more critical points of the winch and components.

2-242. Winch

a. Adjustments.

(1) Drag brake adjustment (A, fig. 2-180).

(a) When unwinding cable, drum should stop as soon as cable pull is stopped. If drum

overruns cable or pulls with a hard drag, adjust drag brake ((b) through (d) below).

(b) Place winch clutch handle (D) in disengaged position.

(c) Release drum lock handle (D).

(d) Turn adjusting screw in $\frac{1}{2}$ turn increments until drag brake operates normally ((a) above). See A, figure 2-180).

Table 2-27. Winch Torque Wrench Specifications

Fig. No.	Location	Pound-feet torque
2-181	Support-to-winch mounting screws	90-110
2-181	Winch-to-power plant compartment mounting screws.	90-110
2-181	Winch-to-carrier mounting screws	305-325
2-184	Propeller shaft-to-yoke U-bolt nuts.	14-17
2-185	Power takeoff-to-transmission mounting screws.	18-22
2-185	Power takeoff-to-transmission stud mounting nuts.	18-22

(2) Automatic brake adjustment (B, fig. 2-180).

(a) Place a 10-ton vehicle or equivalent load on winch cable.

(b) Turn adjusting screw in $\frac{1}{2}$ turn increments until winch will hold 10-ton vehicle or equivalent load.

CAUTION

Automatic brake housing should become warm, but not so hot that a hand cannot be placed on housing. If housing becomes too hot, loosen adjusting screw and adjust.

(3) Mounting alinement adjustment (C, fig. 2-180).

(a) During mounting of winch, aline holes on winch and carrier hull by adjusting tie rod length.

(b) Loosen adjustment nut (A), and position adjusting nuts (C), until winch mounting holes

aline with hull mounting holes. Tighten adjusting nuts.

(4) Drum lock poppet adjustment (D, fig. 2-180).

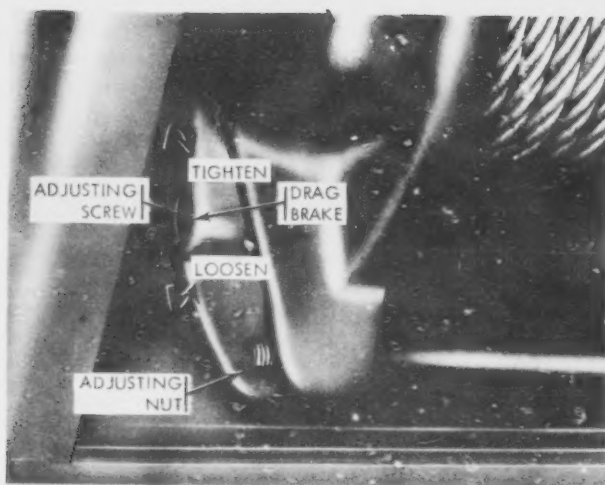
(a) Place drum lock handle in engaged position. When engaged, drum lock poppet should hold drum from turning. When disengaged, drum lock poppet should allow drum to free spool.

(b) Loosen locknut and nut, and turn drum lock poppet clockwise, through hole in bracket, to maximum inward travel.

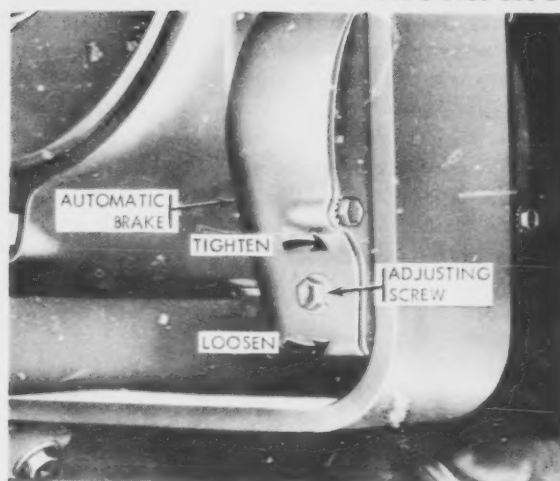
(c) Turn drum lock poppet counterclockwise until distance between maximum inward travel and withdrawn position is $\frac{1}{4}$ inch to $\frac{3}{8}$ inch. Tighten nut and locknut.

(d) Place drum lock handle in disengaged position, and check for free spooling drum.

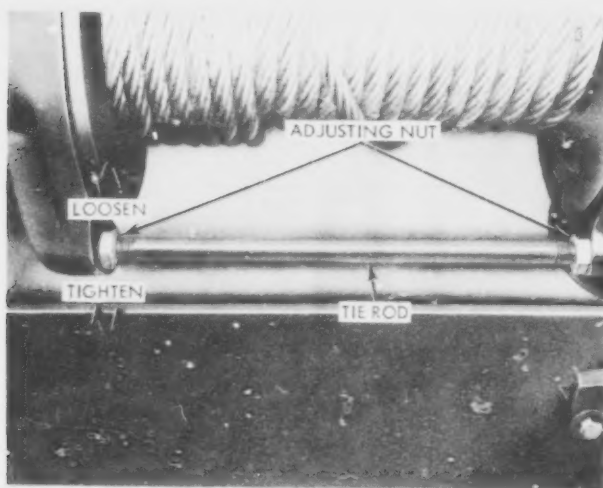
(e) If drum lock poppet does not operate normally ((a) above), repeat (b) through (d) above.



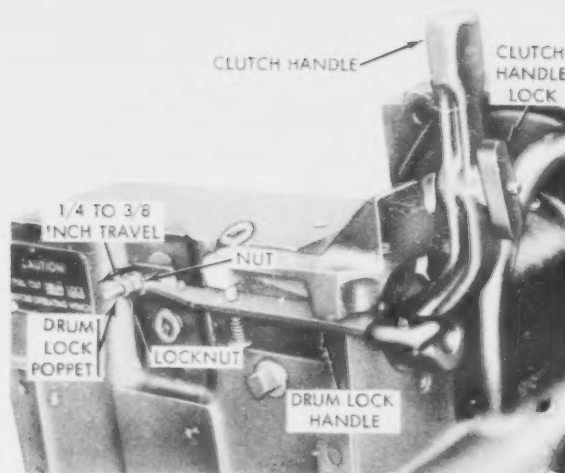
A-DRAG BRAKE ADJUSTMENT



B-AUTOMATIC BRAKE ADJUSTMENT



C-MOUNTING ALIGNMENT ADJUSTMENT



D-DRUM LOCK POPPET ADJUSTMENT

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Figure 2-180. Winch adjustments.

b. Removal of Winch (fig. 2-181).

WARNING

If chain assembly has been repaired with repair links, discard chain and get a new one. A repaired chain is not safe.

(1) Remove nut and screw securing chain assembly to winch cable, and separate chain assembly from winch cable. Discard repaired chain.

(2) Support winch assembly.

WARNING

Winch weight is in excess of 400 pounds; make certain support will withstand this weight to avoid injury to personnel.

(3) Remove four cap screws and two plates securing winch to hull inside power plant compartment bulkhead (A).

(4) Remove two cap screws securing winch

support to outside of hull (C).

(5) Remove two cap screws and washers securing winch guard to outside of hull.

(6) Separate winch from winch transfer gearcase and outside of hull, and remove winch.

NOTE

If winch is difficult to separate from gearcase, fabricate jackscrew from $\frac{3}{4}$ -10UNC x 6 inch screw by threading as far as possible, and use jackscrew in place of screw in gearcase output gear.

(7) Remove two gaskets from winch mounting pads. Discard gaskets.

(8) Remove rubber seal from winch input housing. Discard seal.

(9) Remove key from keyway on winch-to-transfer gearcase shaft.

(10) If replacement winch is to be installed,

remove four screws and two retaining plates securing winch support and guard to winch, and separate support and guard from winch (C).

c. Inspection and Repair.

(1) Before removing winch, inspect for internal malfunction. Inspect housing for oil leaks, breaks, warps, cracks, and other visible damage. Replace winch that shows any of these defects.

(2) Inspect chain assembly for any repaired links. Discard chain assembly that has been repaired.

d. Installation of Winch (fig. 2-181).

(1) If replacement winch is being installed, position winch support and guard on winch, and secure with four screws and two retaining plates (C). Tighten screws securing support to winch to 90 to 100 pound-feet torque.

(2) Install key in keyway on winch-to-transfer gearcase shaft.

(3) Clean three mounting surfaces of winch, and apply a coat of adhesive MIL-A-5092 to each mounting surface. Allow adhesive to dry until tacky. Position two gaskets on winch mounting pads and rubber seal on winch input housing, and secure firmly.

(4) Position winch in cavity in front of carrier hull, and align key in shaft with groove in winch transfer gearcase. Support winch during installation.

WARNING

Make sure lifting device is of sufficient capacity (500 lbs) to safely remove or install the winch.

(5) Align four mounting holes in power plant bulkhead with four mounting holes in winch, and secure winch to hull with four cap screws and two plates. Adjust width as necessary (a(3) above). Screws must be installed from power plant compartment. Tighten four cap screws to 90 to 110 pound-feet torque.

(6) Position winch support to outside hull, and secure with two screws. Adjust width as necessary (a(3) above). Tighten screws to 305 to 325 pound-feet torque.

(7) Position winch guard to outside of hull, and secure with two cap screws and flat washers.

(8) Position chain assembly to winch cable, and secure with screw and nut. Do not install any chain assembly that has been repaired with repair links.

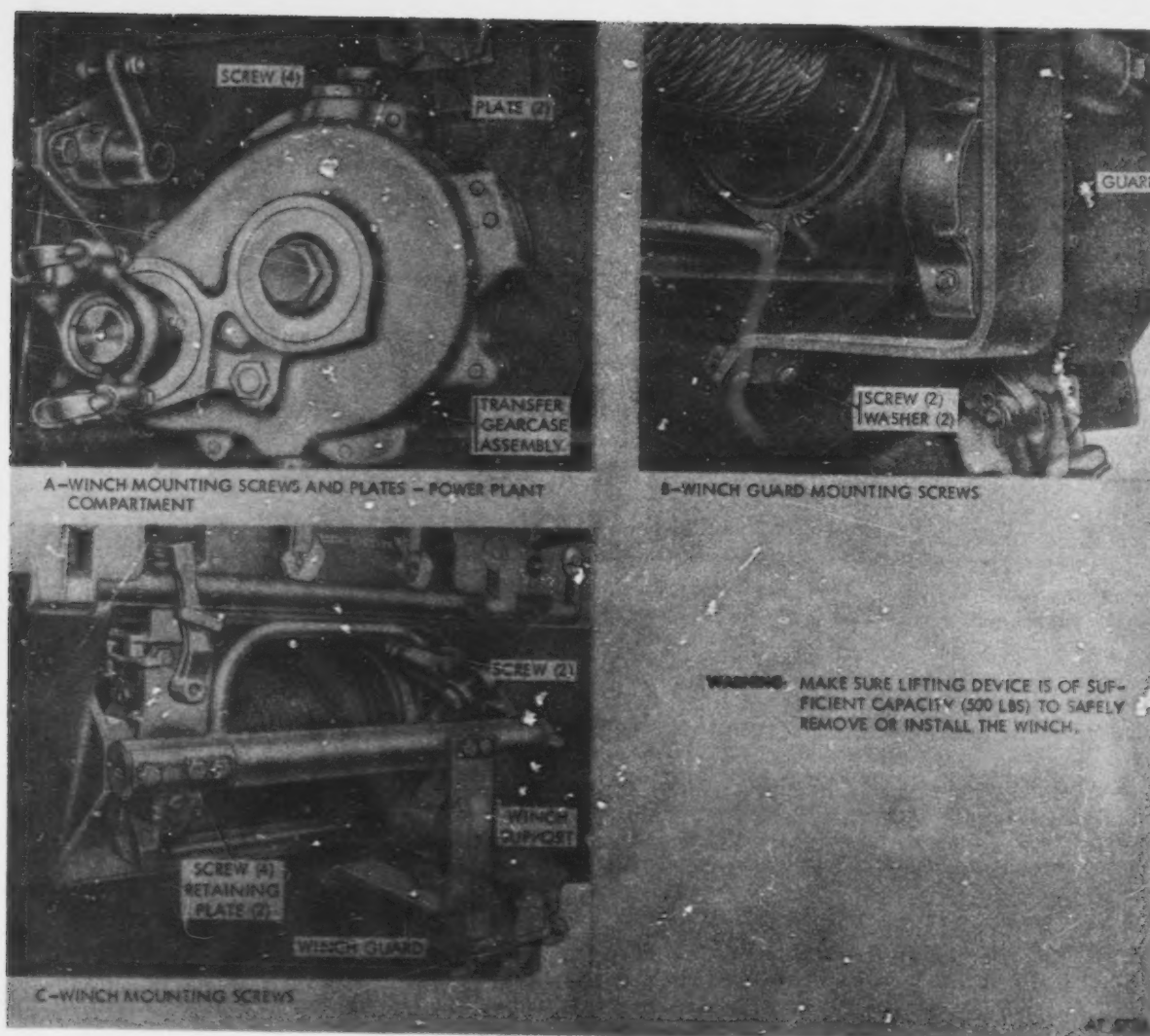


Figure 2-181. Winch mounting points.

2-243. Clutch and Drum Lock Handles (fig. 2-182)

a. Removal.

- (1) Remove setscrew securing clutch handle on shaft, and remove handle.
- (2) Loosen drum lock poppet locknut and nut.

NOTE

If winch is being replaced, remove two nuts, and remove flat washer, and install on replacement winch.

- (3) Remove two screws and one retaining plate securing bracket to winch housing, and remove bracket and drum handle as a unit.

b. Disassembly.

- (1) Remove clutch handle spring pin securing

clutch handle pin, lock, and spring to handle, and separate lock, pin, and spring from handle.

- (2) Remove drum lock handle cotter pin, pin, spring, and washer securing drum lock handle to bracket, and separate handle from bracket. Discard cotter pin.

c. Inspection and Repair.

- (1) Inspect handles and bracket for worn areas, cracks, and distortion. Repair minor cracks and distortions. Replace parts damaged beyond repair.

- (2) Inspect springs for loss of tension and broken condition. Replace spring that shows either of these defects.

- (3) Inspect screws and pins for burred or

damaged threads, worn areas, and missing or damaged condition. Remove burs. Replace screws and pins that show any of the other defects.

d. Assembly.

(1) Position drum lock handle, pin, spring, and washer on bracket, and secure with new cotter pin.

(2) Position clutch handle lock, pin, and spring, to clutch handle, and secure with spring pin.

e. Installation.

(1) Position drum lock handle and bracket on winch housing; install, but do not tighten, two screws and one retaining plate; and install, but do not tighten, drum lock poppet nut, locknut, and washer.

NOTE

If replacement winch is being installed, remove two nuts, install one flat washer on drum lock poppet, and reinstall two nuts. Do not tighten.

(2) Position clutch handle on shaft, and secure with setscrew.

(3) Move clutch handle toward center of winch until clutch is bottomed; adjust bracket until outboard side of slot is within 0.010 maximum of clutch handle pin, and secure two screws (installed in (1) above).

(4) Adjust drum lock poppet (para 2-242).

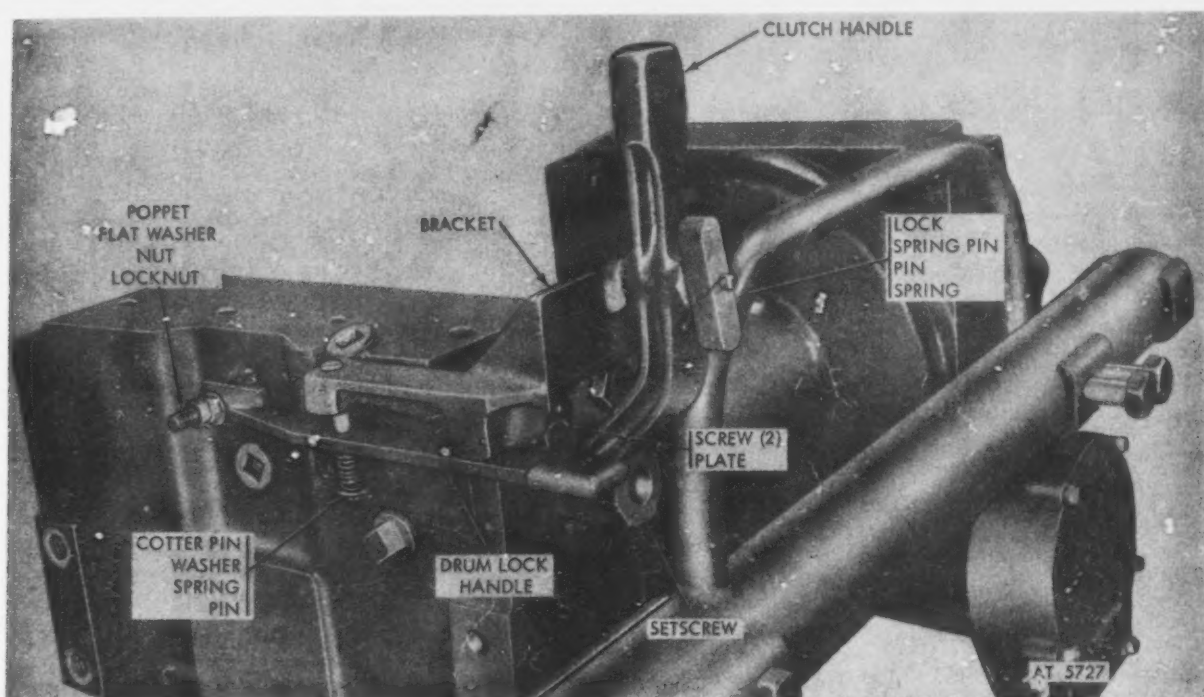


Figure 2-182. Clutch and drum lock handles.

2-244. Winch Cable

(fig. 2-183)

a. Removal.

(1) Position clutch handle in disengaged position, and release drum lock handle (D, fig. 2-180) so winch will free spool.

(2) Pull full length of winch cable from winch drum.

(3) Loosen setscrew securing winch cable to winch drum, and remove cable from hole through drum.

b. Inspection and Repair. Check winch cable for broken strands, frays, excessive wear, and damaged clevis and pin. Replace cable that shows any of these defects.

c. Installation.

(1) Position winch drum so mounting hole for winch cable is at top position, insert cable through hole in drum, and secure with setscrew.

(2) Wind in winch cable (TM 9-1450-585-10).

(3) Lubricate cable (LO 9-1450-585-12).

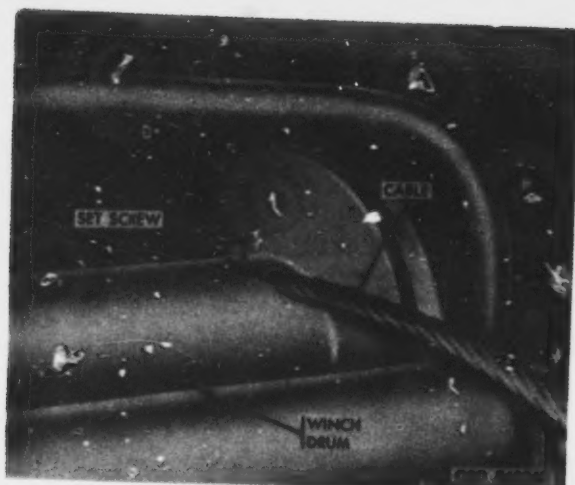


Figure 2-183. Removing or installing winch cable.

2-245. Winch Transfer Gearcase (fig. 2-184)

a. Removal.

- (1) Open cab center floor plates (para 2-222).
- (2) Remove propeller shaft yoke from transfer gearcase (para 2-246).
- (3) Remove self-locking nut, flat washer, and two rubber bushings securing transfer gearcase to hull.
- (4) Separate transfer gearcase from winch shaft, remove transfer gearcase from stud on hull, and remove transfer gearcase.

NOTE

If gearcase is difficult to remove from winch shaft, fabricate jackscrew from $\frac{3}{4}$ -10UNC x 6 inch screw by threading as far as possible, and use jackscrew in place of screw in gearcase output gear.

b. *Inspection and Repair.* Inspect transfer gearcase for cracked or damaged housing, oil leaks, and damaged yoke. Replace damaged yoke. Replace transfer gearcase that shows cracked or damaged housing or oil leaks.

c. Installation.

- (1) Position winch transfer gearcase on winch shaft and on stud in hull.
- (2) Secure winch transfer gearcase to hull with flat washer, self-locking nut, and two rubber bushings.
- (3) Install propeller shaft yoke on transfer gearcase (para 2-246).
- (4) Close cab center floor plates (para 2-222)



Figure 2-184. Winch transfer gearcase and breather.

2-246. Winch Propeller Shaft and Yokes

a. Removal (fig. 2-185).

- (1) Open cab center floor plates (para 2-222).
- (2) Remove locknuts, washers, and four U-bolts securing propeller shaft to winch transfer gearcase and winch power takeoff, and remove propeller shaft.
- (3) Loosen setscrew securing yoke to winch power takeoff, and remove yoke and key from winch power takeoff shaft.
- (4) Remove two cotter pins securing shear pin in winch transfer gearcase, and remove pin. Discard cotter pin.

(5) Remove cotter pin and lock pin securing yoke on winch transfer gearcase, and remove yoke. Discard cotter pin.

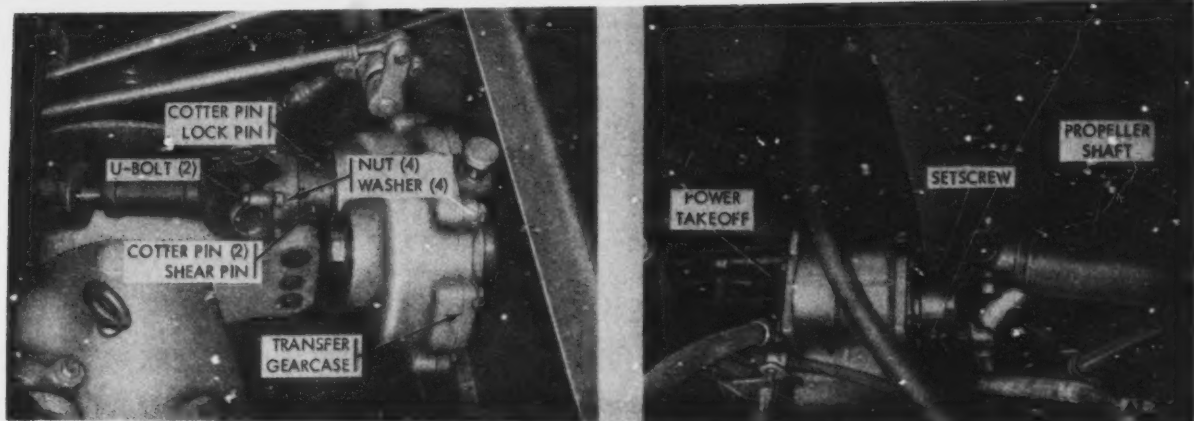


Figure 2-185. Winch propeller shaft and yokes.

b Disassembly (fig. 2-186).

- (1) Back off seal cap (6), and remove yoke (4) from shaft (7).
- (2) Remove grease seal (5) and seal cap (6) from shaft (7). Discard seal.
- (3) Remove two retaining rings (3) securing journal (1) and four bearing caps (2) in yoke (4), and remove journal and caps.
- (4) Remove two retaining rings (3) securing journal (1) and four bearing caps (2) in shaft (7), and remove journal and caps.

NOTE

Remove bearing caps carefully and make certain that bearing cap seal and needle bearings are not lost.

- (5) Remove eight bearing caps (2) from two journals (1).
- (6) Remove one each lubrication fitting (8) from yoke (4) and two journals (1).

c. Inspection and Repair.

- (1) *Journals.* Inspect shafts on journals for grooves and galls that indicate needle bearings are wearing into shafts. Replace universal joints that show either defect.
- (2) *Yoke and shaft.* Inspect splined portion or yoke and shaft for worn, stripped, twisted, chipped, or burred splines. Remove burs. Replace yoke or shaft that shows any of the other defects.
- (3) *Retaining rings.* Inspect retaining rings for nicks, distortion, and excessive wear. Replace rings that show any of these defects. Rings must snap tight in retaining groove for proper operation.

d. Assembly (fig. 2-186).

- (1) Install eight bearing caps (2) on two

journals (1), making certain that bearing cap needle bearings and seals remain in place.

- (2) Install journal (1) and four bearing caps (2) in shaft (7), and secure with two retaining rings (3).

- (3) Install journal (1) and four bearing caps (2) in yoke (4), and secure with two retaining rings (3).

- (4) Install seal cap (6) and new grease seal (5) on shaft (7).

- (5) Install yoke (4) on shaft (7), slide seal (5) and cap (6) down on shaft, and tighten cap hand tight on yoke.

- (6) Install one each lubrication fitting (8) in yoke (4) and two journals (1).

e. Installation (fig. 2-185).

- (1) Position yoke on winch transfer gearcase, and secure with lock pin and new cotter pin.

- (2) Aline shear pin holes in transfer gearcase yoke and shaft, install shear pin, and secure with two new cotter pins.

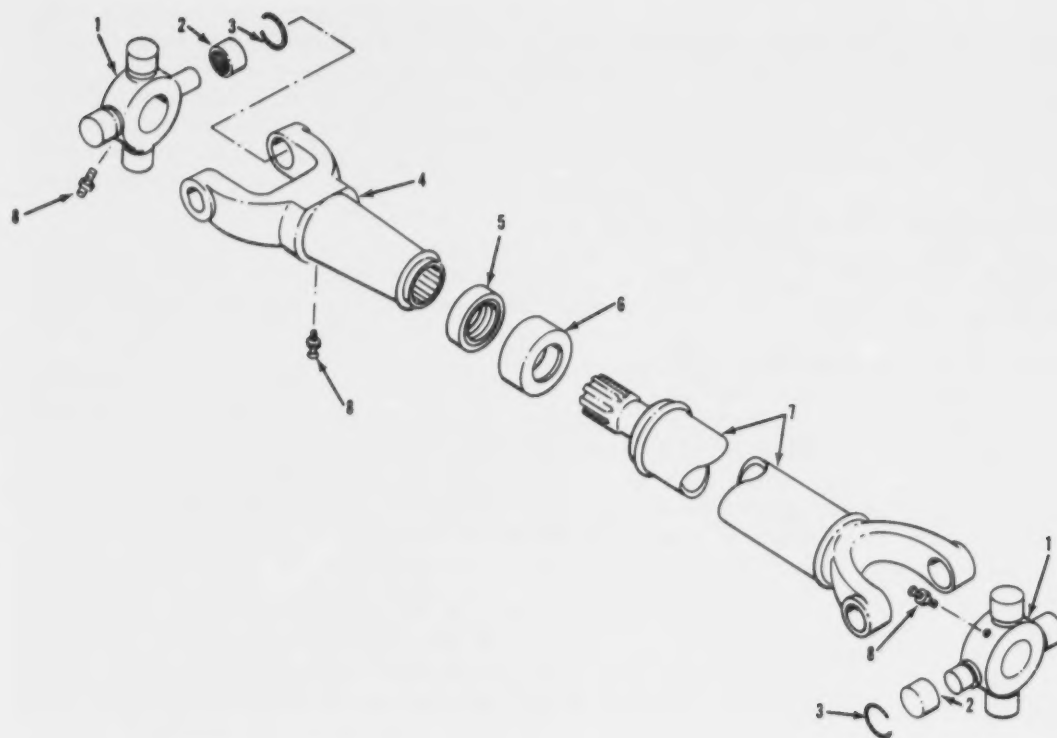
WARNING

Replace broken winch shear pin with pin designed for use in winch; do not use substitute or other material.

- (3) Install key in groove of winch power takeoff shaft, position yoke on shaft, and secure with setscrew.

- (4) Position winch propeller shaft on winch power takeoff and transfer gearcase, and secure with four U-bolts, eight washers, and eight nuts. Tighten nuts to 14 to 17 pound-feet torque.

- (5) Close cab center floor plates (para 2-222).



TA 011981

- 1 Universal joint journal (2)
- 2 Universal joint bearing cap (8)
- 3 Retaining ring (4)
- 4 Yoke

- 5 Grease seal
- 6 Seal cap
- 7 Shaft
- 8 Lubrication fitting (3)

Figure 2-186. Winch drive shaft—exploded view.

2-247. Winch Power Takeoff Control (fig. 2-179)

a. Adjustment.

(1) Push power takeoff control handle (18) all the way in to disengaged position. Turn handle $\frac{1}{4}$ turn clockwise to lock.

(2) Place power takeoff actuating lever (5) in detent for disengaged position.

(3) Thread power takeoff push-pull control casing (10) through power takeoff actuating lever (5), and tighten setscrew (6).

(4) Position control casing (10) to control bracket (25) on power takeoff (14), and secure with clamp (8), cap screw (9), and two nuts (7).

(5) Turn power control handle (18) $\frac{1}{4}$ turn counterclockwise to unlock, and pull handle out to engaged position. Check to make certain power takeoff is in detent for engaged position.

(6) If lever (5) is not in detent for engaged position when power takeoff control handle (18) is pulled all the way out, repeat (1) through (5) above.

b. Removal.

(1) Loosen setscrew (6) securing control casing (10) to power takeoff actuating lever (5).

(2) Remove two nuts (7), cap screw (9), and clamp (8) securing control casing (10) to control bracket (25) on power takeoff.

(3) Remove screw (21), lock washer (20), and loop clamp (19) securing power takeoff push-pull control (15) to stud on power plant compartment floor.

(4) Remove grommet (22) cushioning control (15) at cab floor plate.

(5) Remove screw (4), lock washer (24), and clamp (23) securing control (15) to stud on bulkhead.

(6) Remove nut (1) and lock washer (2) securing control (15) to gear selector housing (3).

(7) Pull control (15) from gear selector housing (3) and into cab.

c. Inspection and Repair.

(1) Inspect control casing for loss of resiliency, cracks, breaks, and cuts. Replace control casing

that shows any of these defects.

(2) Inspect visible portion of control wire for breaks and excessive wear. Replace control that shows either of these defects.

d. Installation.

(1) Thread control (15) from cab through gear selector housing (3).

(2) Secure control (15) to gear selector housing (3) with nut (1) and washer (2).

(3) Position control (15) to stud on bulkhead, and secure with clamp (23), washer (24), and screw (4).

(4) Thread control (15) through hole in cab floor plate, and install grommet (22) to cushion control.

(5) Thread control (15) under differential right final drive and through power plant compartment, and secure to stud on power plant compartment floor with clamp (19), washer (20), and screw (21).

(6) Position control casing (10) to actuating lever (5), and tighten setscrew (6).

(7) Position control casing (10) to control bracket (25), and secure with clamp (8), screw (9), and two nuts (7).

(8) Adjust power takeoff push-pull control (a above).

2-248. Winch Power Takeoff

(fig. 2-187).

a. Removal.

(1) Open cab center floor plates (para 2-222).

(2) Disconnect winch power takeoff control from winch power takeoff (para 2-247).

(3) Disconnect winch propeller shaft from winch power takeoff yoke (para 2-246).

(4) Remove two nuts and washers from studs, remove four screws and washers, and remove power takeoff and gasket(s). Discard gasket(s).

(5) If replacement winch power takeoff is to be installed, remove clamp, yoke, and bracket, and install on replacement power takeoff.

b. Inspection and Repair. Before removal, inspect power takeoff for oil leaks, cracked, dented, or broken housing, distorted covers, and unusual operating noises. Replace power takeoff that shows any of these defects.

c. Installation.

(1) Position winch power takeoff and new gasket(s) on two studs on transmission, and secure with two nuts, two washers, four screws, and four washers.

(2) Remove four screws and washers securing shifter cover assembly to power takeoff, and remove cover assembly.

(3) Check backlash between power takeoff gear and mating transmission gear. Backlash should be between 0.010 to 0.020 inch.

(4) If backlash is less than 0.010 inch, add gasket(s) as required ((3) above). Too many gaskets installed will cause the unit to vibrate. Too few gaskets installed will cause the unit to whine.

(5) Position shifter cover assembly on power takeoff, and secure with four screws and washers.

(6) After adjustment of backlash, secure power takeoff and gasket(s) to transmission with two nuts, two washers, four screws, and four washers. Tighten two nuts and four screws to 18 to 22 pound-feet torque.

(7) Connect winch propeller shaft to winch power takeoff yoke (para 2-246).

(8) Connect winch power takeoff control to winch power takeoff (para 2-247).

(9) Close cab floor plates (para 2-222).

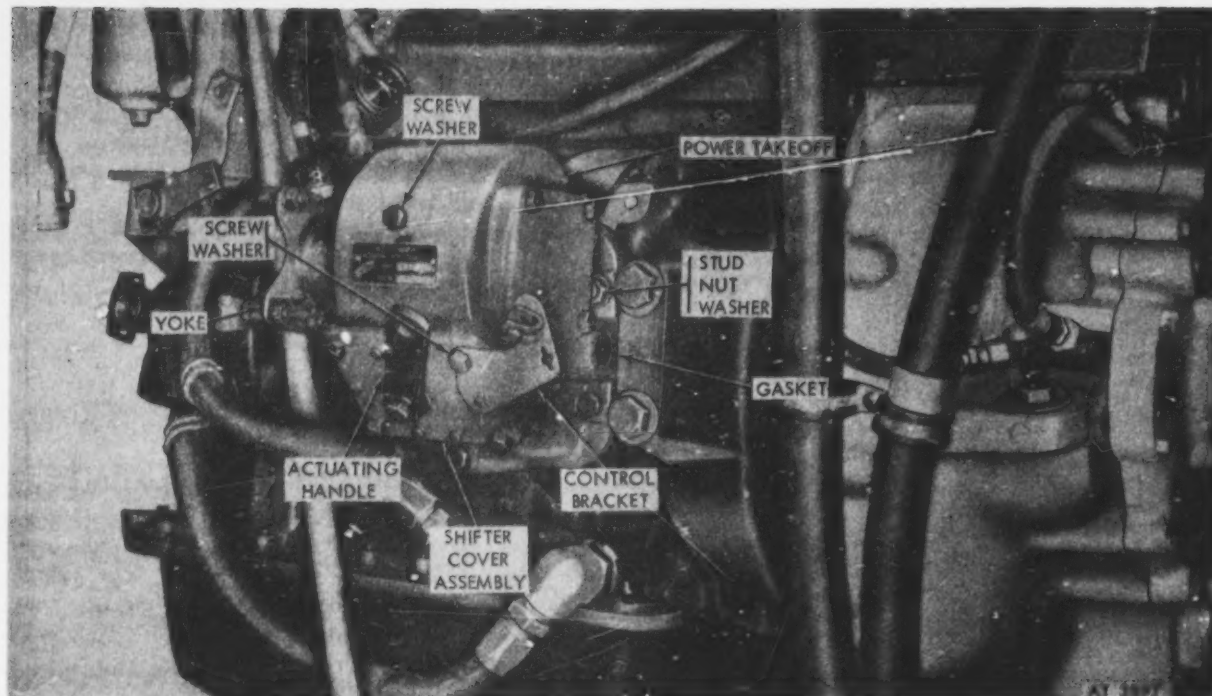


Figure 2-187. Winch power takeoff.

2-249. Winch Transfer Gearcase Breather (fig. 2-184)

a. Removal. Unscrew breather secured in top of transfer gearcase, and remove breather.

b. Cleaning, Inspection, and Repair.

(1) Immerse breather in solvent (SD), and dry with 5 psi compressed air or air dry.

(2) Inspect breather for dents, excessively clogged condition after cleaning, and burred or damaged threads. Remove burs. Replace breather that shows any of the other defects.

c. Installation. Apply a light coat of sealing compound MIL-S-7916 to clean breather threads, and install breather on transfer gearcase.

Section XXVII. MISCELLANEOUS HULL ACCESSORIES

2-250. General

a. Scope. This section contains instructions for removal, inspection and repair, and installation of miscellaneous hull accessories described in *b* below.

b. Description. Miscellaneous hull accessories consist of the rear compartment cover, windshield wipers and motor, speedometer and tachometer instruments and flexible shafts, and the carrier identification plate.

2-251. Rear Compartment Cover (fig. 2-188)

a. Removal and Stowage of Cover. Refer to TM 9-1450-585-10 for removal and stowage of rear compartment cover.

b. Removal of Front Flap Cover Elastic Cord.

(1) Disengage cord ends from two end pieces.

(2) Remove two lock rings from cord ends, and remove two end pieces.

(3) Unstring cord from front flap cover.

c. Inspection and Repair.

(1) Inspect bows, bow stowage supports, stanchions, and stanchion bases for deformation, worn areas, and cracks. Straighten deformed parts. Repair worn cracked parts. Replace parts that are damaged beyond repair.

(2) Inspect rear compartment cover for worn areas, tears, and missing grommets, and for worn or frayed ties and straps. Replace cover or refer to direct support personnel for repair if any of these defects exist.

TM 9-1450-585-20

(3) Inspect ropes and cords for frayed or broken strands. Replace ropes and cords that show either of these defects.

(4) Inspect stanchion quick release pins for bent, broken, or burred pins, and for missing locking balls. Straighten bent pins, and remove burs from burred pins. Replace broken pins, pins with missing locking balls, and pins that are damaged beyond repair.

d. Installation of Flap Cover Elastic Cord.

(1) String cord through eye holes in front flap cover.

(2) Place one end piece on each end of cord with widest opening toward cord end.

(3) Crimp one lock ring on each end of cord at a distance equal to length of end piece coils.

(4) Seat lock ring in each end piece, and pull cord so end piece seats in eye hole.

e. Installation of Cover. Refer to TM 9-1450-585-10 for installation of rear compartment cover.

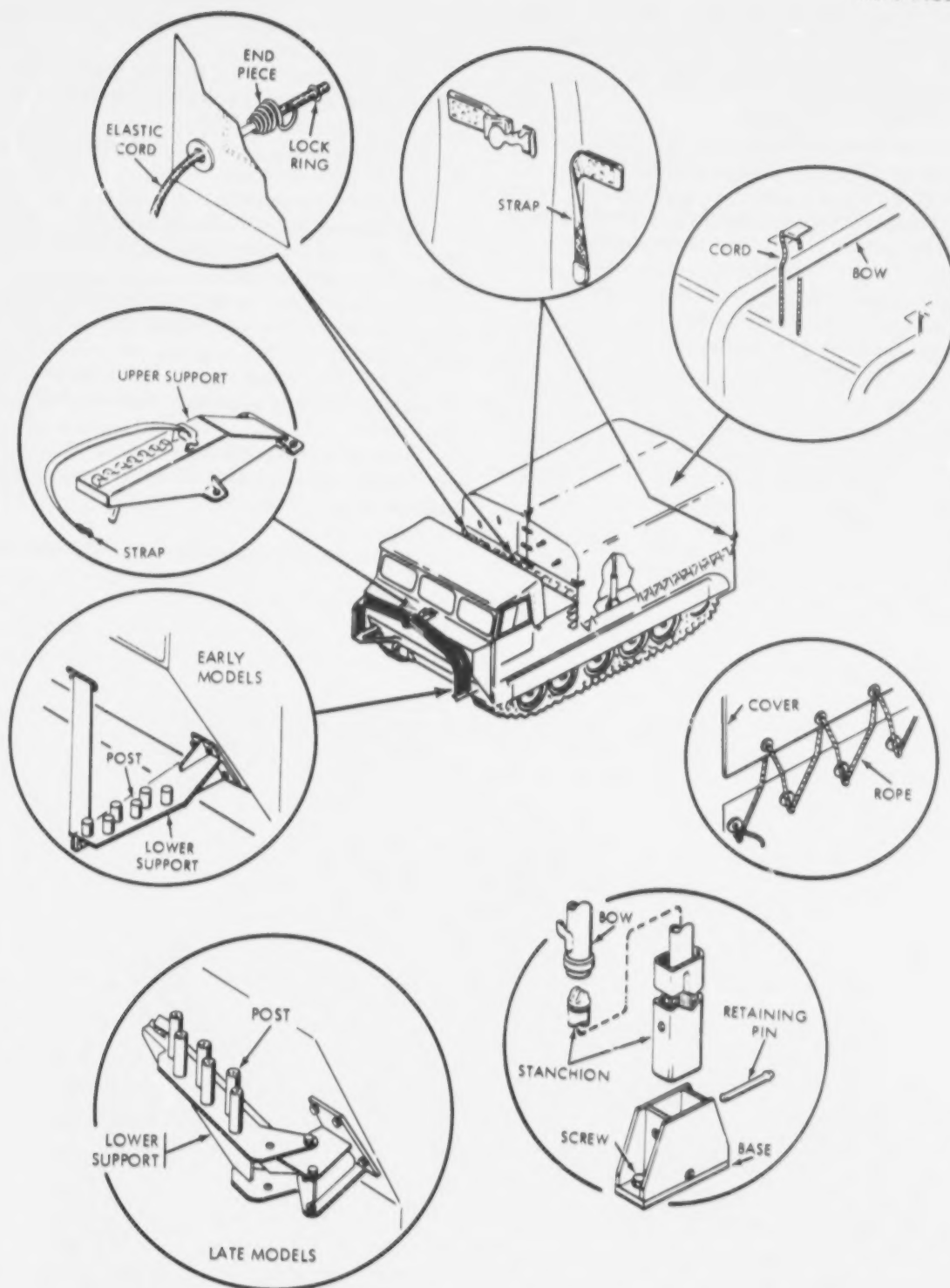


Figure 2-188. Rear Compartment cover.

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2-251.1. Rear Compartment Cover Bow Storage Brackets and Retainer (fig. 2-188.1)

a. Removal.

NOTE

Removal and disassembly instructions apply to either the left or right bracket and rack.

- (1) If required, release clamp (19), loosen strap (1), and remove bows (23) from stowage rack.

NOTE

Early model and late model brackets (fig. 2-188) are removed the same way.

- (2) Remove nut (8), washer (15), and screw (14) securing end of bracket to hull.
- (3) Remove four screws (11), washers (10), and bracket (9) from hull.
- (4) Remove four nuts (18), washers (4), two screws (2), and two screws (3). Remove retainer (26) from hull.

b. Disassembly.

- (1) Remove four nuts (12), eight washers (7), and four screws (6), and separate rack (13) from

bracket (9). If bracket is bolted in the retracted position, remove two more nuts (21), four washers (22), and two screws (24).

- (2) If required, release strap clamp (19), and remove nut (5), two washers (4), screw (27), and strap (1) from retainer (26).

- (3) Remove two screws (16), washers (17), and clamp (19) from retainer.

c. Inspection and Repair.

- (1) Inspect strap for fraying, broken stitching, and wear. Replace worn or damaged strap. Be sure pins are secure in strap.

- (2) Inspect mounting brackets and racks for deformation, cracks, and other damage. Replace badly damaged parts.

- (3) Inspect strap clamp for deformed latch. Straighten latch if required. Replace badly damaged part.

- (4) Inspect retainer for cracks around mounting flanges and for any other damage. Replace badly damaged part.

d. Assembly.

- (1) Place clamp (19) on retainer (26), and secure

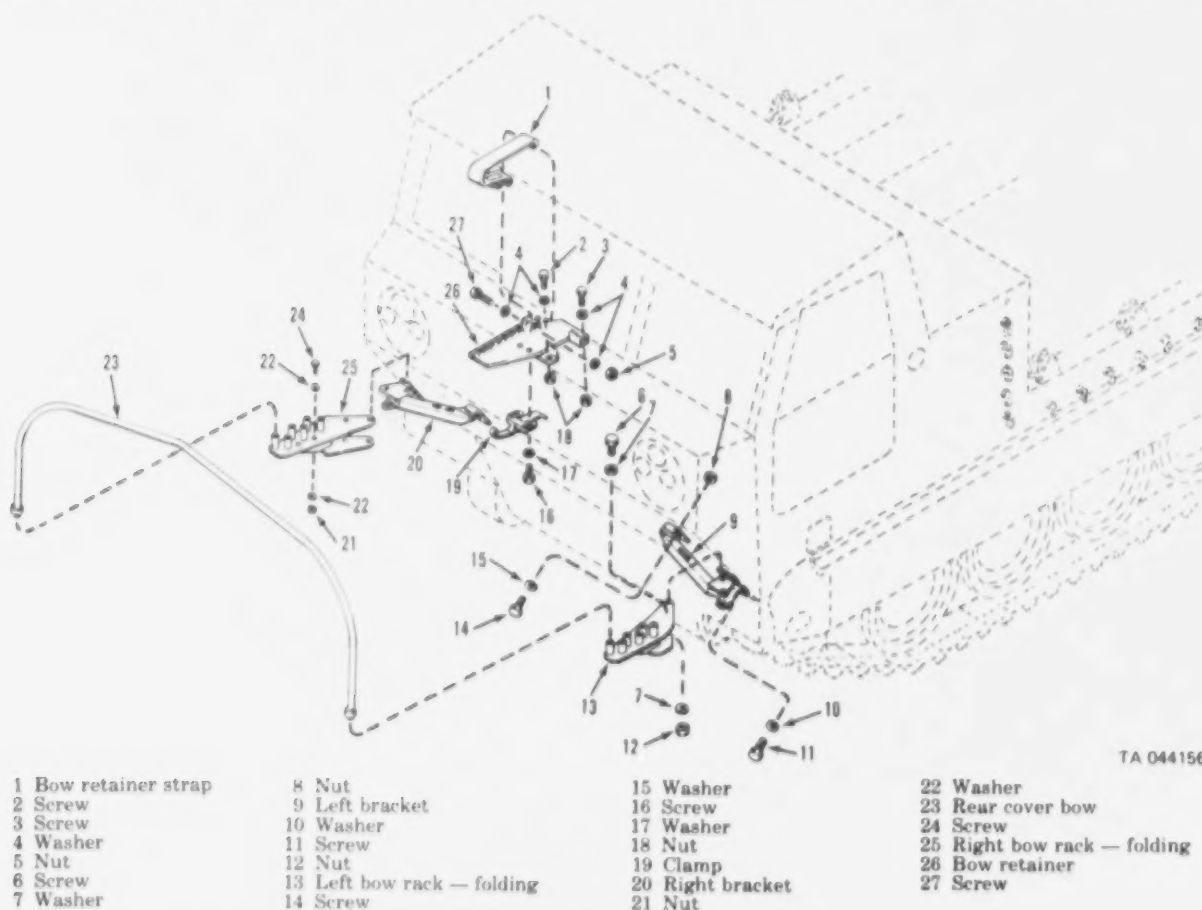


Figure 2-188.1. Bow storage racks (late models).

with two washers (17) and screws (16).

(2) Position strap (1) in retainer (26), and install screw (27), two washers (4), and nut (5).

(3) If bows (23) are to be loaded on rack, position bracket (9) in rack (13), and install four screws (6), eight washers (7), and four nuts (12). If bows are not being loaded, install rack in retracted position as instructed in (4) below.

(4) Install two screws (6), four washers (7), and two nuts (8) in end holes in rack (13). Do not tighten nuts. Fold rack against bracket (9) and align holes between bracket and rack. Install two screws (24), four washers (22), and two nuts (21). Tighten two nuts (8).

(5) If bows are not going to be stowed, place strap (1) over and under retainer (26). Engage clamps (19) on second pin of strap.

e. Installation.

(1) Position bracket (9) against hull, and install screw (14), washer (15), and nut (8). Align other end of bracket, and install four screws (11) and washers (10).

NOTE

When installing retainer (26), the longest screws (2) are used in the front holes.

(2) Position retainer (26) on hull, and install four screws (2 and 3), washers (4), and nuts (18).

2-252. Flotation Curtain (fig. 2-189)

a. Removal and Stowage. Refer to TM 9-1450-585-10.

b. Inspection and Repair.

(1) Inspect flotation curtain for worn areas, tears, and missing grommets. Replace curtain or refer to direct support personnel for repair if any of these defects exists.

(2) Inspect ropes for frayed or broken strands. Replace rope that shows either of these defects.

(3) Inspect flotation exhaust duct, tailgate beam, metal curtain strips, and stanchions for bent, deformed, and cracked parts. Straighten deformed and bent parts. Repair cracked parts. Replace parts that are damaged beyond repair.

(4) Refer to paragraph 2-220 for inspection and installation of upper tailgate-to-hull corner seals.

(5) Inspect tailgate beam quick release pins for bent, broken, or burred pins, and for missing locking balls. Straighten bent pins, and remove burs from burred pins. Replace broken pins, pins with missing locking balls, and pins that are damaged beyond repair.

c. Installation. Refer to TM 9-1450-585-10.

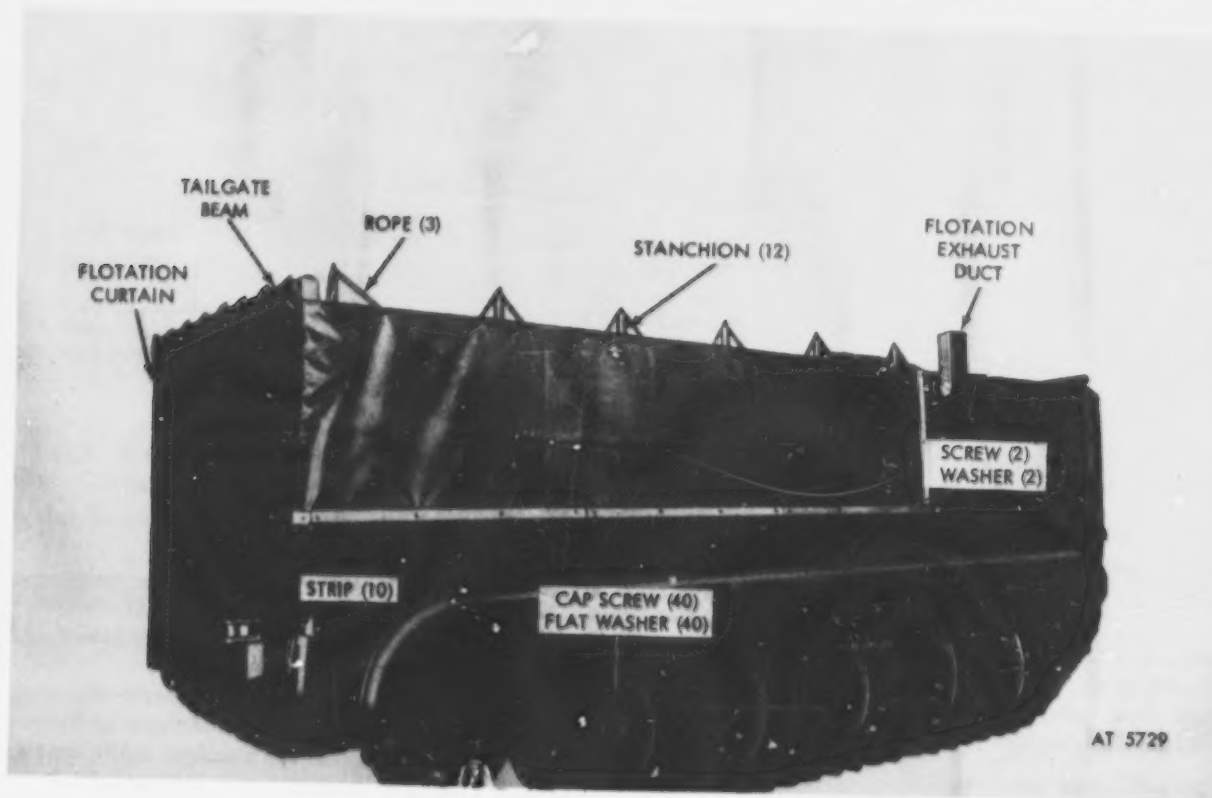


Figure 2-189. Flotation curtain and attaching parts.

2-253. Windshield Wiper Motor and Linkage

(fig. 2-190)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove two link spring clips (4) and two flat washers (3) securing wiper link (5) to motor link (8) and adjacent pivot assembly in cab, and remove wiper link.

(2) Remove motor link nut (6) and washer (7) securing motor link (8) to wiper motor (12), and remove motor link.

(3) Remove nipple (17) protecting circuit 71 lead connection.

(4) Remove screw (16) and two lock washers (15), and disconnect circuit 71 lead (18).

(5) Remove screw (13), nut (9), and loop clamp (11) securing wiper motor (12) to side of mounting bracket (10).

(6) Remove three screws (2) and six lock washers (1) securing wiper motor (12) to mounting bracket (10), and remove wiper motor.

b. Inspection and Repair.

(1) Check wiper motor as described in electrical troubleshooting (para 2-27). Replace wiper motor if defective.

(2) Inspect wiper motor housing and linkage for cracks, breaks, and excessive wear. Replace

wiper motor or linkage that shows any of these defects.

c. Installation.

(1) Position wiper motor (12) to mounting bracket (10), and secure with three screws (2) and six lock washers (1).

(2) Secure wiper motor (12) with loop clamp (11), screw (13), and nut (9).

(3) Position circuit 71 lead (18) on wiper

motor (12), and secure with screw (16) and two lock washers (15).

(4) Secure protective nipple (17) over circuit 71 lead connection.

(5) Secure motor link (8) to wiper motor (12) with motor link nut (6) and washer (7).

(6) Position wiper link (5) to adjacent pivot assembly and motor link (8), and secure with two flat washers (3) and two link spring clips (4).

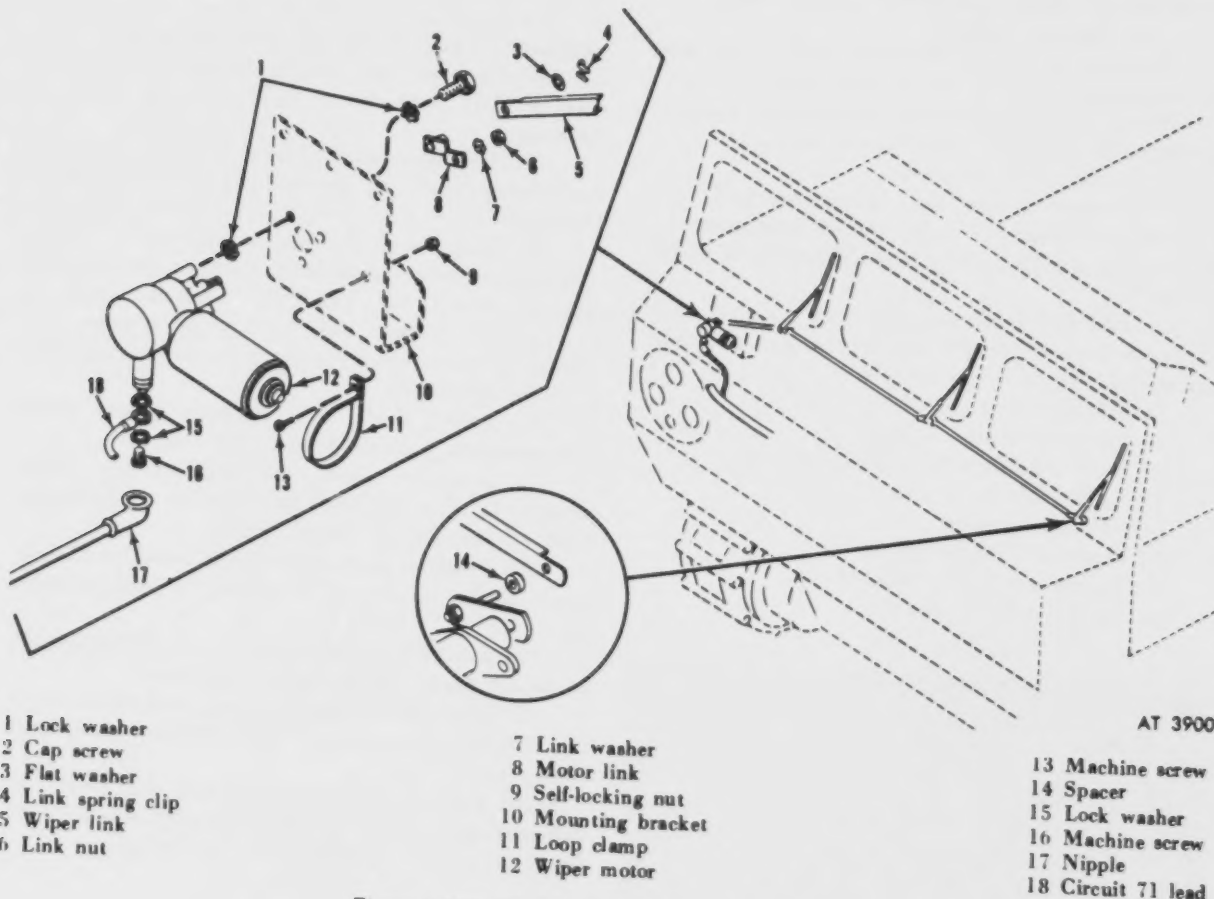


Figure 2-190. Windshield wiper motor and linkage.

2-254. Windshield Wiper Switch
(fig. 2-35)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect circuit 71 lead (4) and circuit 71A lead (5) from back of windshield wiper switch (3).

(2) Remove two screws (1) and washers (2) securing windshield wiper switch (3) to instrument panel (26), and remove switch.

b. Inspection and Repair. Check windshield wiper switch as described in electrical

troubleshooting (para 2-27). Replace switch if defective.

c. Installation.

(1) Position windshield wiper switch (3) in instrument panel (26), and secure with two screws (1) and washers (2).

(2) Connect circuit 71A lead (5) and circuit 71 lead (4) at back of windshield wiper switch (3).

(3) Turn master switch ON, and check windshield wiper switch for functional operation.

2-255. Windshield Wiper Arm and Blade
(fig. 2-191)

a. Adjustments.

- (1) *Wiper blade.*
 - (a) Loosen blade adjusting screw.
 - (b) Aline blade with arm, and tighten blade adjusting screw.
- (2) *Wiper arm.*
 - (a) Place windshield wiper switch in OFF position.
 - (b) Loosen locknut securing arm to pivot.
 - (c) Pivot arm and blade until blade is next to but not touching windshield rubber seal.
 - (d) Tighten locknut.
 - b. *Removal of Blade.* Remove screw and nut securing blade to arm, and remove blade.
 - c. *Removal of Arm.* Remove locknut and washer securing arm to pivot, and remove arm.
 - d. *Inspection and Repair.*
 - (1) Inspect blade for worn, cracked, or deteriorated rubber and deformed or broken metal components. Replace blade that shows any of these defects.
 - (2) Inspect arm for damaged spline and cracked or broken metal components. Replace arm that shows any of these defects.
 - e. *Installation of Blade.*
 - (1) Position blade on arm.
 - (2) Secure blade with screw and nut.
 - (3) Adjust blade (a above).
 - f. *Installation of Arm.*
 - (1) Position arm on pivot.
 - (2) Secure arm with locknut.
 - (3) Adjust arm (a above).

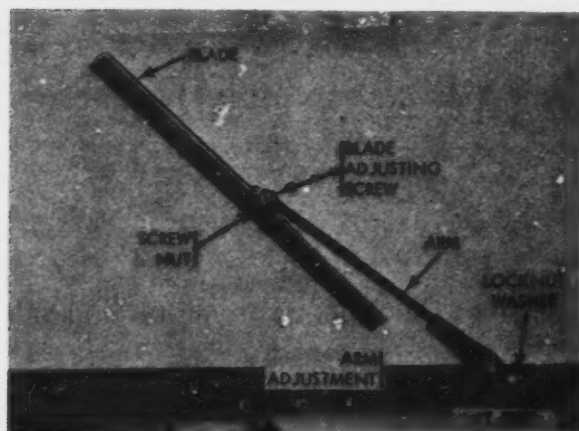


Figure 2-191. Windshield wiper arm and blade.

2-256. Speedometer Flexible Shaft (fig. 2-192)

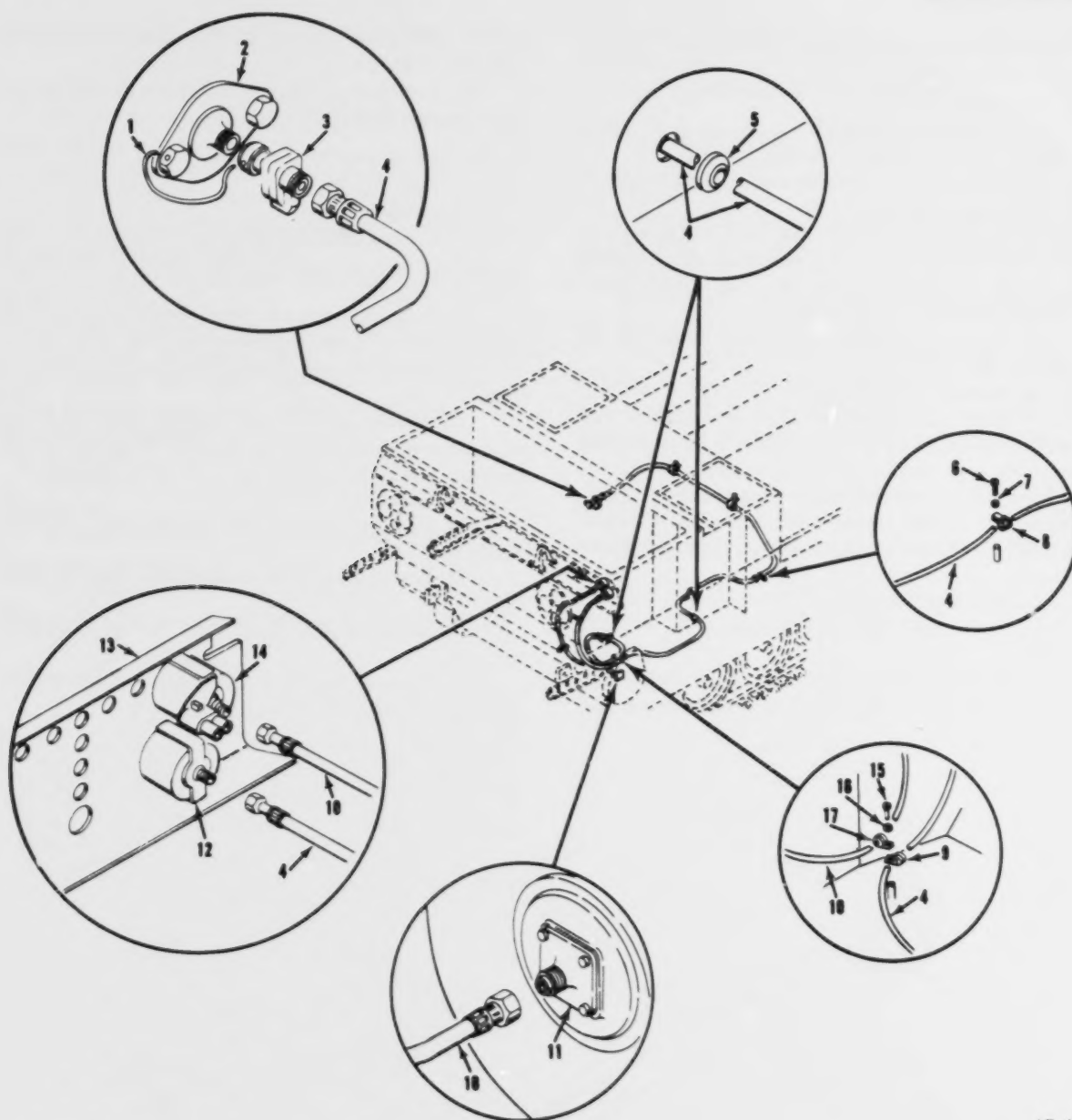
a. *Removal.*

- (1) Remove six left floor plate screws (11, fig. 2-160) and washers (12), securing floor plate (10 in cab, and remove plate.
- (2) Disconnect speedometer flexible shaft (10, fig. 2-192) at speedometer (14) on instrument panel (13) and at speedometer drive adapter (11) on left final drive.
- (3) Remove two single clamp screws (6), washers (7), and clamps (8) securing shaft to hull.
- (4) Remove one double clamp screw (15), washer (16), and clamp (17) securing shaft to sponson.
- (5) Remove and discard grommet (5) cushioning shaft at power plant compartment bulkhead.
- (6) Remove shaft from carrier cab.

b. *Inspection and Repair.* Inspect speedometer flexible shaft for cracked, broken, cut, or deteriorated rubber and burred or broken end fittings. Replace shaft if defects cannot be repaired.

c. *Installation.*

- (1) Insert shaft (10) through power plant compartment bulkhead and into cab.
- (2) Connect shaft to speedometer drive adapter (11) on left final drive and to speedometer (14) on instrument panel (13).
- (3) Position shaft on hull, and secure with two single clamp screws (6), washers (7), and clamps (8).
- (4) Install new grommet (5) to cushion shaft at power plant compartment bulkhead.
- (5) Position shaft on sponson, and secure with one double clamp screw (15), washer (16), and clamp (17).
- (6) Position left floor plate (10, fig. 2-167) in cab, and secure with six left floor plate screws (11, fig. 2-167) and washers (12, fig. 2-167).



AT 5731

- 1 Locking wire
- 2 Engine tachometer adapter
- 3 Tachometer drive adapter
- 4 Tachometer flexible shaft
- 5 Grommet
- 6 Single clamp screw

- 7 Single clamp washer
- 8 Single clamp
- 9 Tachometer double clamp
- 10 Speedometer flexible shaft
- 11 Speedometer drive adapter

- 12 Tachometer
- 13 Instrument panel
- 14 Speedometer
- 15 Double clamp screw
- 16 Double clamp washer
- 17 Speedometer double clamp

Figure 2-192. Speedometer and tachometer flexible shafts.

2-257. Speedometer
(fig. 2-46)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect speedometer flexible shaft (14) from speedometer (10).

(2) Remove two nuts (13), lock washers (12), and mounting clamp (11) securing speedometer and circuit breaker bracket (11, fig. 2-62) to instrument panel (15, fig. 2-46).

(3) Remove speedometer from front of instrument panel.

b. Inspection and Repair.

(1) Check speedometer for free rotation and operation of moving parts. Replace speedometer that binds and does not operate smoothly.

(2) Inspect speedometer for broken glass, cracked or dented case, and damaged threads. Replace speedometer that shows any of these defects.

c. Installation.

(1) Pack core (9) with grease (LO 9-1450-585-12).

(2) Position mounting clamp (11) and circuit breaker bracket (11, fig. 2-62) to speedometer, and

secure with two nuts (13, fig. 2-46) and lock washers (12).

(3) Connect speedometer flexible shaft (14) to speedometer (10).

2-258. Speedometer Flexible Shaft Core
(fig. 2-193)

a. Removal.

(1) Disconnect speedometer flexible shaft (3) at speedometer (1) and at final drive speedometer adapter (5).

(2) Pull out core (9) from final drive end of shaft as far as possible. Remove lock (8).

(3) Remove core through speedometer end of shaft.

b. Inspection and Repair. Inspect core for worn or loose end fittings and broken or marred strands. Replace core that shows any of these defects.

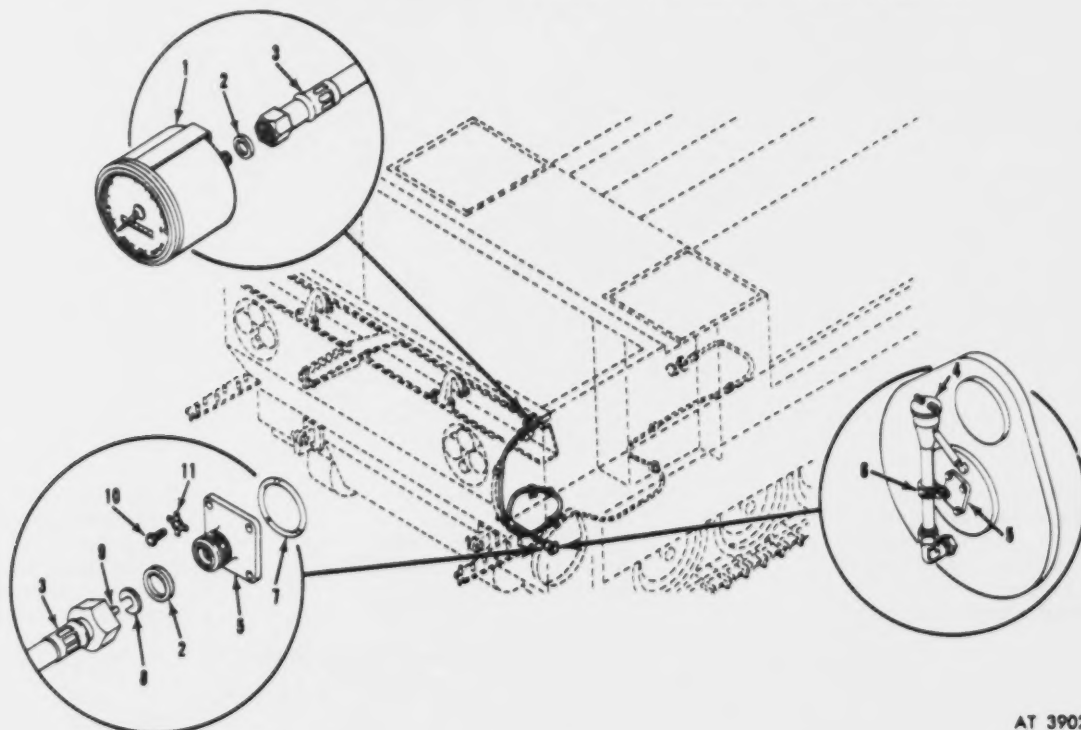
c. Installation.

(1) Pack core (9) with grease (LO 9-1450-585-12).

(2) Insert core into speedometer end of shaft (3).

(3) Secure core at final drive end of shaft with lock (8).

(4) Connect shaft to final drive speedometer adapter (5) and to speedometer (1).



- 1 Speedometer
- 2 Flexible shaft core gasket
- 3 Speedometer flexible shaft
- 4 Final drive filler tube

- 5 Final drive speedometer drive adapter
- 6 Final drive filler tube clamp
- 7 Speedometer adapter preformed packing

- 8 Flexible shaft core lock
- 9 Flexible shaft core
- 10 Speedometer adapter cap screw
- 11 Speedometer adapter key washer

AT 3902

Figure 2-193. Speedometer flexible shaft core and adapter.

2-259. Speedometer Drive Adapter

(fig. 2-193)

a. Removal.

(1) Disconnect speedometer flexible shaft (3) at final drive.

(2) Remove four cap screws (10), key washers (11), and clamp (6) securing filler tube (4), and separate speedometer drive adapter (5) from final drive. Discard key washers.

(3) Remove and discard preformed packing (7) from adapter.

b. Inspection and Repair. Inspect mounting surface and packing seat for nicks, scratches, and burs. Inspect threaded areas for burs. Remove burs. Replace adapter if damage cannot be removed or repaired.

c. Installation.

(1) Position new preformed packing (7) on adapter (5).

(2) Position adapter on final drive, and position filler tube clamp (6) on adapter.

(3) Apply a light coat of antizeize compound MIL-A-907 to screw threads, and secure adapter

and clamp with four cap screws (10) and new key washers (11).

(4) Connect shaft (3) to adapter.

2-260. Tachometer Flexible Shaft Core

(fig. 2-194)

a. Removal.

(1) Disconnect tachometer flexible shaft (3) at tachometer (1) and at engine tachometer drive adapter (6).

(2) Pull core (8) from engine end of shaft as far out as possible. Remove lock (7).

(3) Remove core from tachometer end of shaft.

b. Inspection and Repair. Inspect core for worn or loose end fittings and broken or marred strands. Replace core that shows any of these defects.

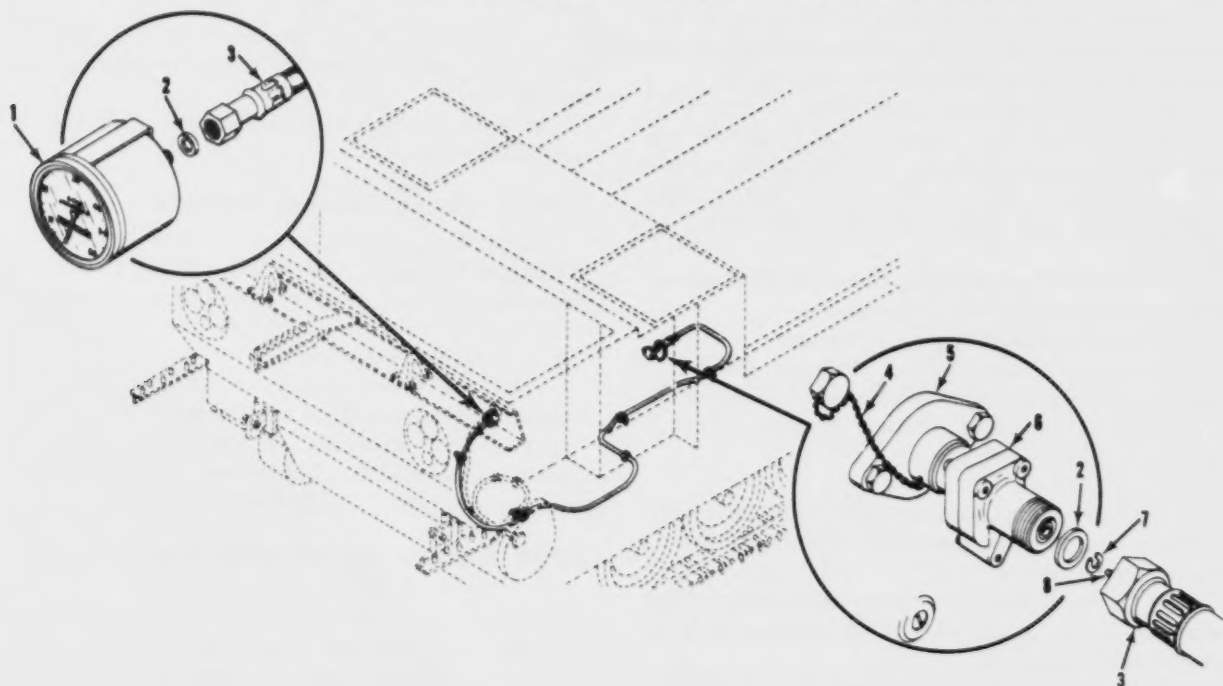
c. Installation.

(1) Pack core (8) with grease (LO 9-1450-585-12).

(2) Insert into tachometer end of shaft (3).

(3) Secure core at engine end of shaft with lock (7).

(4) Connect shaft to engine tachometer drive adapter (6) and to tachometer (1).



AT 3903

- | | |
|------------------------------|-----------------------------------|
| 1 Tachometer | 5 Engine connection |
| 2 Flexible shaft core gasket | 6 Engine tachometer drive adapter |
| 3 Tachometer flexible shaft | 7 Flexible shaft core lock |
| 4 Drive adapter locking wire | 8 Flexible shaft core |

Figure 2-194. Tachometer flexible shaft core and adapter.

2-251. Tachometer Drive Adapter (fig. 2-194)

a. Removal.

(1) Disconnect tachometer flexible shaft (3) at engine.

(2) Remove locking wire (4), and remove tachometer drive adapter (6) from engine connection (5). Discard locking wire.

b. *Inspection and Repair.* Inspect adapter threaded areas for burrs or nicks. Replace adapter if defects cannot be removed or repaired.

c. Installation.

(1) Install adapter (6) on engine connection (5), and secure with new locking wire (4).

2-262. Tachometer Flexible Shaft (fig. 2-192)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove six left floor plate screws (11, fig. 2-160) and washers (12) securing floor plate (10) in cab, and remove plate.

(2) Disconnect tachometer flexible shaft (4, fig. 2-192) at tachometer (12) on instrument panel (13) and at engine tachometer drive adapter (3).

(3) Remove batteries (para 2-98).

(4) Remove five single clamp screws (6), washers (7), and clamps (8), securing shaft to hull.

(5) Remove one double clamp screw (15), washer (16), and clamp (9) securing shaft to sponson.

(6) Remove and discard grommet (5) cushioning shaft at battery box bulkhead.

(7) Remove shaft from carrier cab.

b. *Inspection and Repair.* Inspect shaft for cracked, broken, cut or deteriorated rubber and for burred or broken end fittings. Replace shaft if defects cannot be repaired.

c. Installation.

(1) Insert shaft (4) under left floor plate (10, fig. 2-160) in cab, through battery box, and into power plant compartment.

(2) Connect shaft to engine tachometer drive adapter (3, fig. 2-192) and to tachometer (12) on instrument panel (13).

(3) Position shaft on hull, and secure with five single clamp screws (6), washers (7), and clamps (8).

(4) Install new grommet (5) to cushion shaft at battery box bulkhead.

(5) Position shaft on sponson, and secure with one double clamp screw (15), washer (16), and clamp (9).

(6) Install batteries (para 2-98).

(7) Position left floor plate (10, fig. 2-160) in cab,

and secure with six left floor plate screws (11), and washers (12).

2-263. Tachometer (fig. 2-46)

a. Removal.

(1) Disconnect tachometer flexible shaft (22) from tachometer (26).

(2) Remove two nuts (23), lock washers (24), and mounting clamp (25) securing tachometer to instrument panel (15).

(3) Remove tachometer from front of instrument panel.

b. Inspection and Repair.

(1) Check tachometer for free rotation and operation of moving parts. Replace tachometer that binds and does not operate smoothly.

(2) Inspect tachometer for broken glass, cracked or dented case, and damaged threads. Replace tachometer that shows any of these defects.

c. Installation.

(1) Position tachometer (26) on instrument panel (15).

(2) Position mounting clamp (25) to rear of tachometer, and secure with two nuts (23) and lock washers (24).

(3) Connect tachometer flexible shaft (22) to tachometer (26).

2-263.1. Noise Caution Markers

a. *Inspection.* Inspect caution markers for wear or damage that may make them difficult to read. If markers have not been installed or need replacement, follow instructions in *b* below.

b. Installation (fig. 2-194.1).

(1) Clean areas on carrier for installation of marker per process C1 of specification MIL-P-116.

(2) Install markers on carrier in positions shown in figure 2-194.1. If new markers are needed, procure them per NSN 9905-00-198-2728.

2-264. Carrier Identification Plate (fig. 2-195)

a. *Removal.* Shear heads of four rivets, and separate identification plate from right cab door.

b. *Inspection and Repair.* Inspect plate for tears, scratches, and illegibility. Replace plate that shows any of these defects.

c. *Installation.* Position plate to right cab door, and secure with four new rivets.

NOTE

If plate is being replaced, replacement plate must show data pertinent to specific carrier.

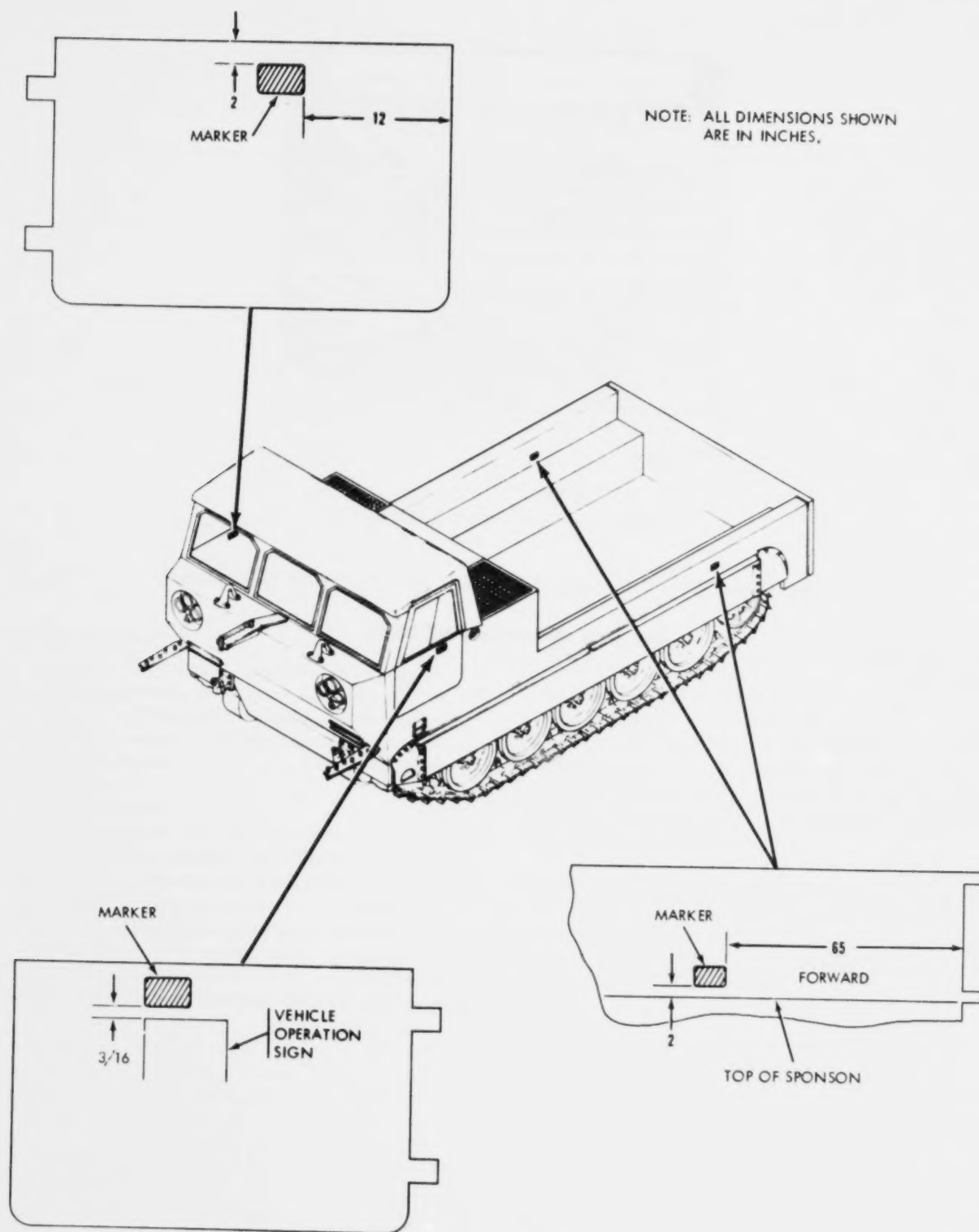


Figure 2-194.1. Noise caution marker locations.

TA 044157 ■

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Figure 2-195. Carrier identification plate.

Section XXVIII. PORTABLE AND FIXED FIRE EXTINGUISHERS

2-265. General

a. Scope. This section contains instructions for removal, inspection and repair, and installation of the fixed fire extinguisher cylinder, discharge tubes, fittings, and nozzles; disassembly of the controls; and maintenance of portable and fixed fire extinguishers.

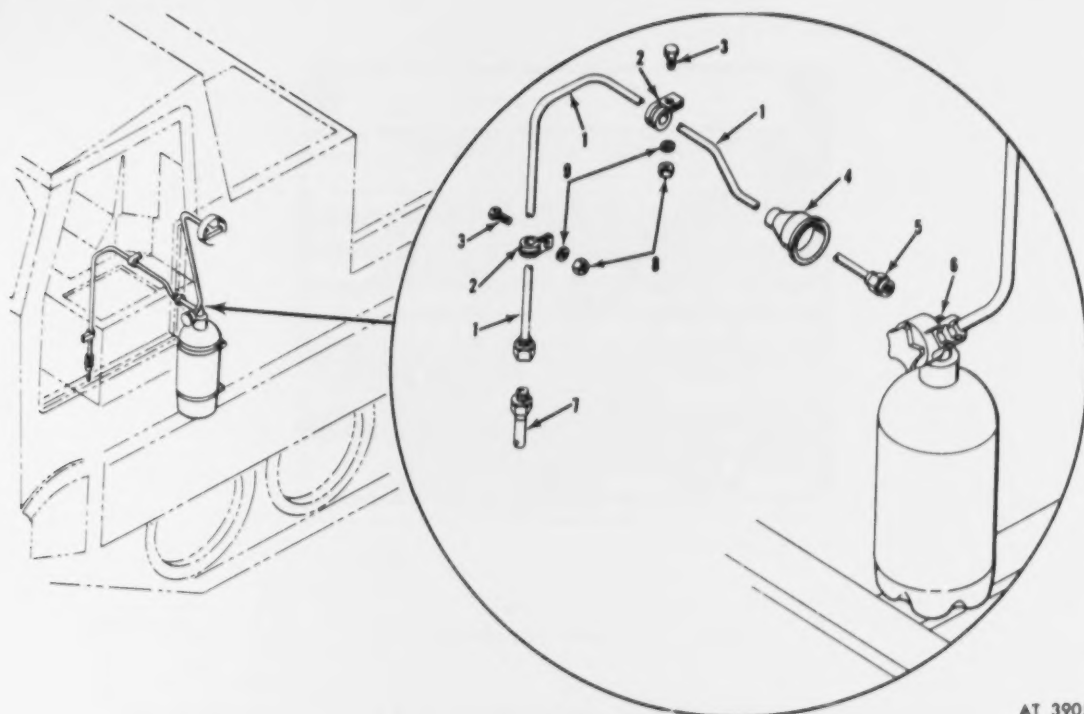
b. Description.

(1) *Portable fire extinguisher.* The portable fire extinguisher consists of a cylinder containing 5 pounds of carbon dioxide gas, control head, and spray nozzle. The portable fire extinguisher is strapped to a bracket in the front of the cab.

(2) *Fixed fire extinguisher.* The fixed fire extinguisher system consists of a cylinder containing 5 pounds of carbon dioxide gas, control

head, spray nozzle, and steel tube assembly and fittings. The control head can be operated from inside the carrier by a handle on the control head, or from outside the carrier by a handle on the outside of the hull behind the driver's seat. The exterior control handle is connected to the control head by a control cable enclosed in a flexible tube assembly. See figure 2-196 for location of fixed fire extinguisher components.

c. Maintenance. Both portable and fixed fire extinguisher cylinders must be removed from the carrier and weighed every three months, or during scheduled quarterly maintenance service. Record date of last filling and correct weight on tag, and attach tag to control head.



AT 3905

- 1 Tube
- 2 Clamp
- 3 Clamp screw

- 4 Tube boot
- 5 Tube nut
- 6 Control valve

- 7 Extinguisher nozzle
- 8 Clamp nut
- 9 Clamp washer

Figure 2-196. Fixed fire extinguisher system.

2-266. Fixed Fire Extinguisher Controls (fig. 2-197)

a. Removal.

- (1) Loosen control nut (19), and remove internal control valve (14) from CO₂ cylinder (13).
- (2) Loosen lower tube nut (27) from tube inner adapter (26).
- (3) Pull external control handle (11), breaking external seal wire (10). Remove and discard wire.
- (4) Remove external control insert (8) from handle (11).
- (5) Pull control cable (1) with fastener (12) from handle (11), and remove fastener.
- (6) Pull control cable (1) from cable tube assembly (2), and remove internal control valve (14).
- (7) Loosen upper tube nut (3) from tube outer adapter (7), and remove cable tube assembly (2).
- (8) Remove inner nut (4) and outer nut (5), and remove tube outer adapter (7).
- (9) Remove tube inner adapter (26) from control valve housing (18 or 20).

b. Disassembly of Internal Control Valve (Fyr-Fyter).

- (1) Remove and discard internal seal wire (33).
- (2) Remove two internal seal screws (15) and washers (16), and separate internal control reel (17) from control valve housing (18).
- (3) Lift cable end ball from reel (17), and remove cable (1) from housing (18).
- (4) Remove plunger (34) and plunger spring (35).

c. Disassembly of Internal Control Valve (Walter Kidde).

- (1) Remove and discard internal seal wire (22).
- (2) Remove two internal seal screws (23) and washers (24), and remove internal control valve cover (21) from control valve housing (20).
- (3) Lift out internal control reel (25), and remove internal control cable (30) and external control cable (1) from reel.
- (4) Remove external control cable (1) from control valve housing (20).

(5) Remove internal control cable (30) from valve housing (20).

(a) Partially pull internal control handle (28) from control valve housing (20).

(b) Separate control handle (28) from internal control insert (31), and remove handle, cable fastener (29), and insert from control cable (30).

(c) Remove control cable (30) from control valve housing (20).

(6) Unscrew internal control adapter (32) from control valve housing (20).

d. Inspection and Repair.

(1) Inspect control valve for distortion and damaged threads. Replace control valve if parts show either of these defects.

(2) Inspect control cable(s) for loose or damaged ball ends and for worn or frayed cable strands. Replace control valve if parts show any of these defects.

(3) Inspect tubes for restriction and cracks. Replace tube that shows either of these defects.

(4) Inspect adapters, screws, and nuts for distortion and damaged threads. Replace parts that show either of these defects.

e. Assembly of Internal Control Valve (Fyr-Fyter).

(1) Insert external control cable (1) into control valve housing (18), and place cable end ball in reel (17). Turn reel clockwise about $\frac{1}{2}$ turn.

(2) Position plunger spring (35), plunger (34), and reel (17) in control valve housing (18).

(3) Secure reel to housing (18) with two internal seal screws (15) and washers (16).

(4) Turn internal control reel (17) to set position, making sure control cable (1) winds on reel. If control cable fails to wind on reel, disassemble control valve (b above), and repeat steps (1) through (3) above.

(5) Install new internal seal wire (33), and crimp seal on wire.

f. Assembly of Internal Control Valve (Walter Kidde).

(1) Install internal control adapter (32) on control valve housing (20).

(2) Install internal control cable (30) on control valve housing:

(a) Thread control cable through valve housing adapter and internal control insert (31).

(b) Loop control cable end around cable fastener (29), and pull cable tight into internal control insert (31).

(c) Secure control handle (28) to insert (31), and position in adapter (32).

(3) Install external control cable (1) in control valve housing (20).

(4) Position internal control valve reel (25) in control valve housing (20), and position internal control cable and external control cable around reel so ball on each cable is secured behind lobe on reel.

(5) Position control valve cover (21) on control valve housing (20), and secure with two internal seal screws (23) and washers (24).

(6) Aline set marks on control valve cover. Make certain control cables wind around reel. If cables fail to wind around reel, disassemble control valve (c above), and repeat steps (1) through (5) above.

(7) Install new internal seal wire (22), and crimp seal on wire.

g. Installation.

(1) Thread external control cable (1) through tube inner adapter (26) and through cable tube assembly (2) and secure adapter to control valve. Tighten lower tube nut (27) to adapter.

(2) Secure tube outer adapter (7) with one outer nut (5) and one inner nut (4).

(3) Thread control cable (1) through tube outer adapter (7), and secure control tube assembly (2) to tube outer adapter with upper tube nut (3).

(4) Thread control cable through external control insert (8), and loop cable end around fastener (12). Pull cable tight in insert.

(5) Secure external control handle (11) in vertical position to external control insert (8), and position handle in adapter.

(6) Install new external seal wire (10) with one external seal screw (9) and one seal nut (6).

(7) Tighten lower tube nut (27).

NOTE

Make certain control valve is in set position and seal is properly installed.

(8) Position internal control valve (14) on CO₂ cylinder (13) and tighten control nut (19).

LEGEND to fig. 2-197

- 1 Control cable
- 2 Cable tube assembly
- 3 Upper tube nut
- 4 Inner nut
- 5 Outer nut
- 6 Seal nut
- 7 Tube outer adapter
- 8 External control insert
- 9 External seal screw
- 10 External seal wire
- 11 External control handle
- 12 External control fastener
- 13 CO₂ cylinder assembly
- 14 Internal control valve
- 15 Internal seal screw (Fyr-Fyter)
- 16 Internal seal washer (Fyr-Fyter)
- 17 Internal control reel (Fyr-Fyter)
- 18 Control valve housing (Fyr-Fyter)
- 19 Control nut
- 20 Control valve housing (Walter Kiddle)
- 21 Internal control valve cover (Walter Kiddle)
- 22 Internal seal wire (Walter Kiddle)
- 23 Internal seal screw (Walter Kiddle)
- 24 Internal seal washer (Walter Kiddle)
- 25 Internal control reel (Walter Kiddle)
- 26 Tube inner adapter
- 27 Lower tube nut
- 28 Internal control handle (Walter Kiddle)
- 29 Internal cable fastener (Walter Kiddle)
- 30 Internal control cable (Walter Kiddle)
- 31 Internal control insert (Walter Kiddle)
- 32 Internal control adapter (Walter Kiddle)
- 33 Internal seal wire (Fyr-Fyter)
- 34 Plunger
- 35 Plunger spring

2-267. Discharge Tube, Fittings, and Nozzle

(fig. 2-196)

a. Removal.

- (1) Remove extinguisher nozzle (7) from tube assembly (1).
- (2) Remove two screws (3), nuts (8), washers (9), and clamps (2) securing tube assembly to battery box.
- (3) Loosen nut (5), and disconnect tube assembly at control valve (6).
- (4) Remove boot (4) and tube assembly from battery box.

b. Inspection and Repair.

- (1) Inspect tube assembly for cracks, deformation, and damaged threads. Replace tube assembly that shows any of these defects.
- (2) Inspect fittings for cracks, deformation, and damaged threads. Replace parts that show any of these defects.

c. Installation.

- (1) Position tube assembly (1) with boot (4) to battery box, and secure with two clamps (2), washers (9), screws (3), and nuts (8).

- (2) Connect tube assembly to control valve (6), and secure with nut (5).
- (3) Install nozzle (7) on tube assembly.

2-268. Fixed Fire Extinguisher Cylinder

(fig. 2-198)

a. Removal.

- (1) Remove control valve (para 2-266).
- (2) Loosen nut (3), and disconnect discharge tube assembly (2) at control valve (6).
- (3) Loosen two nuts (8), and disengage two clamps (7) securing CO₂ cylinder (5) to battery box compartment bulkhead (1).
- (4) Remove cylinder from carrier.

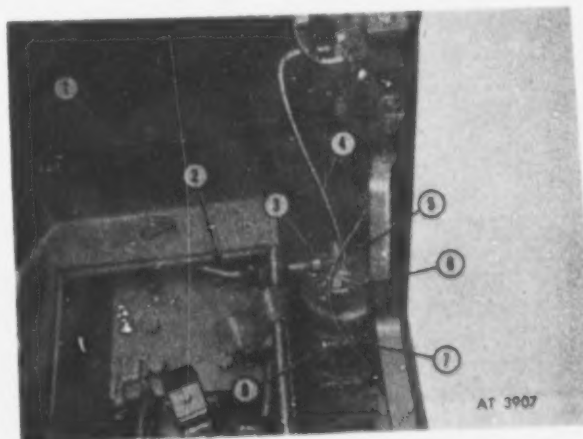
b. Inspection and Repair. Inspect cylinder and cylinder valve for dents, damaged threads, and distortion. Replace cylinder that shows any of these defects.

c. Installation.

NOTE

Weigh cylinder before installation to determine the amount of contents. If cylinder weighs less than weight specified on cylinder, install full charged replacement cylinder.

- (1) Position CO₂ cylinder (5) in two clamps (7), and secure with two nuts (8).
- (2) Connect discharge tube assembly (2) to control valve (6), and tighten nut (3).
- (3) Install control valve (para 2-266).



- 1 Battery box compartment bulkhead
- 2 Discharge tube assembly
- 3 Discharge tube assembly nut
- 4 Control cable tube assembly
- 5 CO₂ cylinder
- 6 Fire extinguisher control valve
- 7 Cylinder clamp
- 8 Clamp nut

Figure 2-198. Fixed fire extinguisher cylinder.

Section XXIX. ALUMINUM WELDING INSTRUCTIONS

2-269. General

a. Scope. This section contains a description of equipment and materials to perform aluminum welding repairs; a listing of aluminum hull alloys and their respective positions on the carrier; instructions for working with magnesium castings and a listing of their respective positions on the carrier; and instructions for the MIG welding process, safety precautions, welding gun position, and general instructions.

b. Equipment and Materials.

(1) Portable welder (fig. 2-199).

(a) Linde

3431-972-7672

7610-C-12210 (mfr manual)

(b) Westinghouse

3431-879-9709

TM 5-3431-200-15

TM 5-3431-200-20P

7610-C-1-2089 (mfr manual)

(c) Manual welding gun, with spool-on-gun attachment.

(d) Voltage control unit.

(e) Inert gas supply, regulator-flowmeter, hose, and fittings.

(2) 5356 filler wire.

(3) DC welding generator (200 amperes minimum capacity).

(4) Helmet, protective clothing.



Figure 2-199. Aluminum welding equipment (typical).

c. Aluminum Hull Alloys. Almost all of the hull, all extrusions, and internal sheet panels are made of 5083 aluminum alloy. For best results, additions to the hull should be of the same aluminum alloy types.

CAUTION

Do not attempt to weld castings of aluminum or magnesium. These castings are not to be repaired by welding. Magnesium filings are a fire hazard.

d. Magnesium Castings. Magnesium castings used require observance of special safety precautions when filing or grinding. Finely divided particles of magnesium are a fire hazard. Follow safety precautions listed below when working with or near magnesium parts. Refer to table 2-28 for a listing of magnesium castings.

(1) Use grinding equipment marked FOR MAGNESIUM ONLY.

(2) Keep tools sharp.

(3) Do not allow magnesium dust or airdust mixtures to accumulate; keep area clean.

(4) Dispose of grinding sludge immediately.

(5) Wear leather or smooth, fire-retardant clothing; brush frequently.

(6) Keep fire extinguisher for magnesium handy.

WARNING

Do not use water or foam-type extinguishers—these will intensify a magnesium chip fire.

c. Aluminum Castings. Refer to table 2-29 for a listing of aluminum castings.

2-270. MIG Welding Process (fig. 2-200)

MIG (metal-inert-gas) welding is a process using a dc power source, control panel, and a welding gun which feeds a consumable bare electrode at a given rate into a molten pool beneath a blanket of protective inert gas. When an arc is established, a molten pool forms immediately, and welding progresses by moving the welding gun along the joint line at a rate that shapes a bead of desired dimensions. The protective covering of inert gas shields the weld zone from contamination by the atmosphere. No flux is necessary.

Table 2-28. Magnesium Castings

Major component	Part	Part number	Alloy
Differential	Adapter, differential oil lines	10865948	AZ91C, 92A
	Plate, adapter	8756605	AZ91C, 92A
	Retainer, oil seal	10886461	AZ91C, 92A
	Housing, differential	8756603	AZ91C, 92A
	Cover, differential housing	8756613	AZ91C, 92A
Fan	Fan (rotor), 20 in. diameter cooling	10949772	AZ91C, 92A

Table 2-29. Aluminum Castings

Component	Part	Part number
Controls	Housing, range selector	10917352 (19207)
	Lever, left steering	10907493 (19207)
	Lever, right steering	10907492 (19207)
Differential	Housing, input bearing	8756606 (19207)
	Housing, right angle gearbox	8756602 (19207)
Final drive	Housing assembly	10890371 (19207)
Transfer gearcase	Housing, transfer gearcase	8756392 (19207)
	Cover, transfer gearcase	8756393 (19207)
Housing	Fan, engine cooling	11616515 (19207)

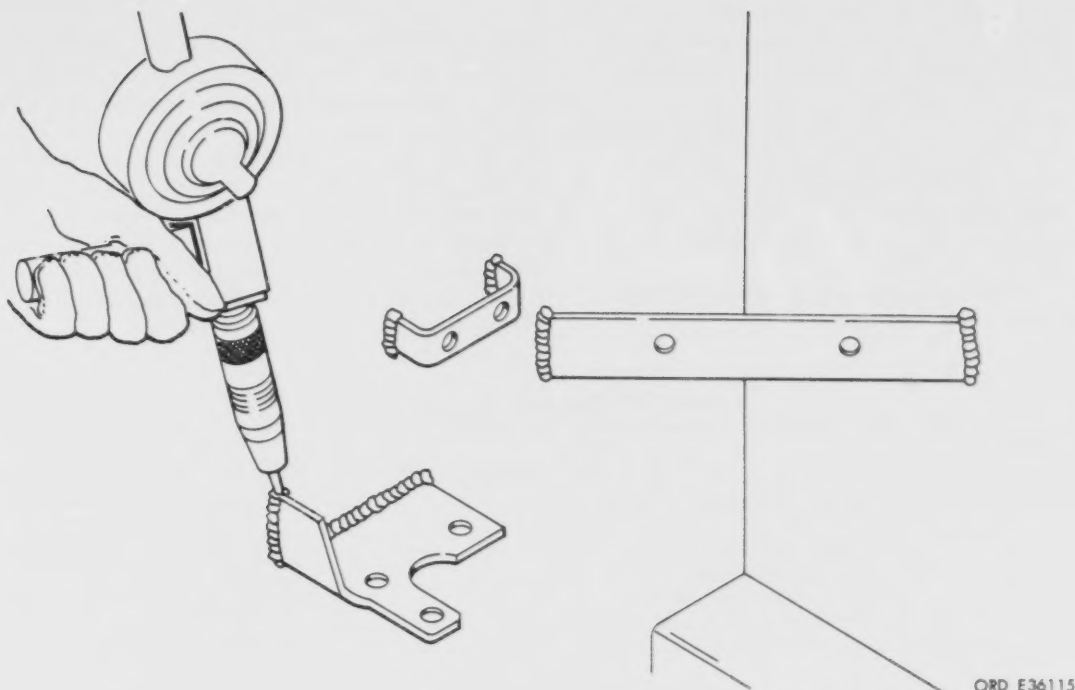


Figure 2-200. Aluminum welding process.

2-271. Safety Precautions

a. Do not look directly at welding arc unless protected by welding hood. Wear flash goggles or tinted safety glasses (No. 2) in immediate welding area.

b. Wear lightproof clothing such as leather, asbestos, or heavy denim. Do not wear clothing with loose pockets, trouser cuffs, or rolled up sleeves. Do not expose bare skin to arc.

c. Take precautions against electric shock.

(1) Never change parts or make repairs without first disconnecting or shutting down power source.

(2) Do not touch drive mechanism or any portion of electrode.

d. Provide adequate ventilation without excessive drafts in welding area, and remove all combustibles and toxic materials.

e. Make certain all connections are tight.

f. Do not touch any metal in welding area with bare hands; aluminum does not change color when heated.

2-272. Position of Welding Gun

a. *Lead Angle and Cant Angle* (fig. 2-201). Position gun for lead angle of 10° to 15° off vertical, and point gun in direction of weld travel to insure good gas coverage, cleaning, and preheating

of material. Position gun for perpendicular cant angle of 90° to parent metal to insure that filler wire and arc are directed toward apex of groove for equal fusion on both sides of material, even weld buildup, good gas coverage, and equal penetration.

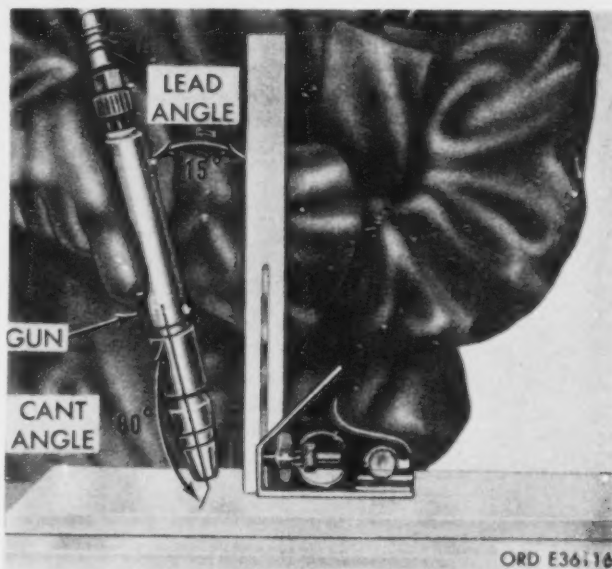


Figure 2-201. Gun lead angle and cant angle.

b. Nozzle Clearance (fig. 2-202). Maintain nozzle clearance of $\frac{1}{2}$ to $\frac{3}{8}$ inch to provide good gas coverage. Improper nozzle clearance will cause oxide deposits within the weld bead, force gas bubbles into the weld, or prevent cleaning action on the material in front of the weld pool.

c. Arc Length (fig. 2-202). When the correct arc length is struck, a smooth hissing or buzzing sound will be produced.

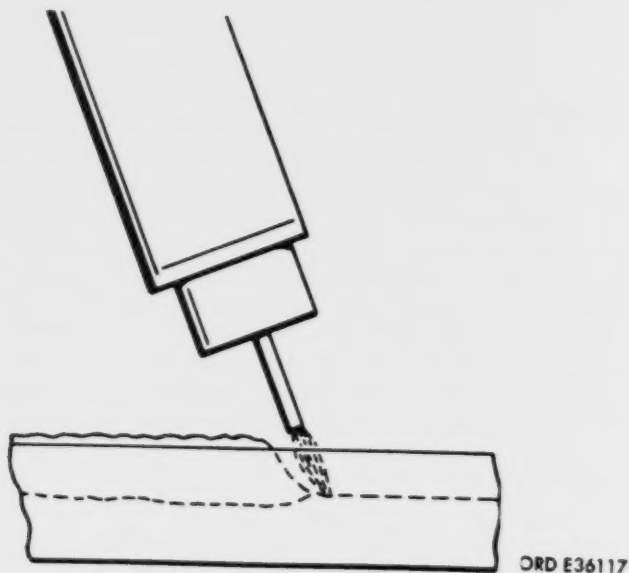


Figure 2-202. Nozzle clearance and arc length.

2-273. General Welding Instructions

a. Contraction and Expansion. Aluminum welds contract about 6 percent in volume when solidifying from the molten state. Welding at a slow rate of speed may cause excessive heating of the surrounding area, thus creating overexpansion and later contraction while cooling.

b. Filler Wire.

(1) Always use clean wire. Filler wire contaminated by grease, oil, dust, or shop fumes causes porous welds.

(2) After welding, cover wire to prevent contamination.

(3) Store covered wire in warm, dry place.

c. Cleaning of Welding Surfaces. Remove oxides, grease, oil films, and all foreign matter from joint before welding. Brush thoroughly with clean stainless steel wire brush to reduce oxide level, and wipe edges of joint with clean cloth dipped in solvent such as alcohol or acetone to remove remaining foreign matter. Allow surfaces to dry before welding.

d. Fit-Up and Tacking. Good joint fit-up makes welding easier, saves filler wire and gas, and helps in obtaining high quality welds. Tack welding is necessary to hold the joint members in position if jigs are not used. Tack welds should be small, neat, and correctly placed to maintain proper alignment before and during welding.

e. Welding Unequal Sections. When welding unequal sections, direct arc against heavier piece to fuse the two edges evenly. Watch weld pool edge rather than arc to insure that weld pool edges fuse properly.

f. Multi-Pass Welding.

(1) Make certain edges of weld pool fuse properly. Observe weld pool edges rather than arc. Any oscillating or weaving motion should be slight, smooth, and slow.

(2) Scour material with clean stainless steel wire brush after each pass.

(3) On small weldments, lower amperage slightly after each pass if welding members become excessively hot.

CHAPTER 3

MATERIEL USED IN CONJUNCTION WITH MAJOR ITEM

Section I. PERSONNEL HEATER SYSTEM

3-1. General

This section contains description and instruction for removal, disassembly and assembly, cleaning, inspection and repair, installation, and testing of the personnel heater system.

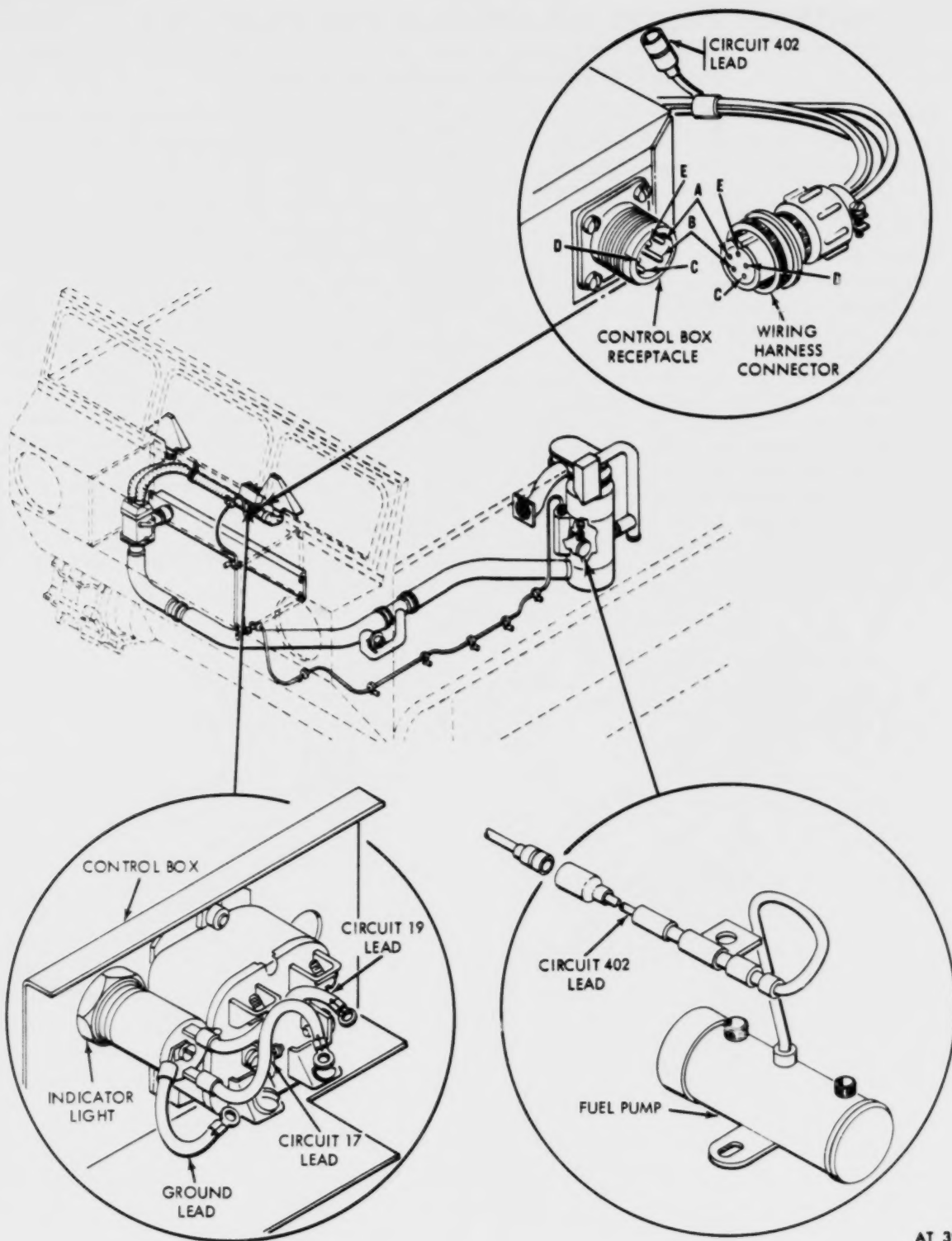
3-2. Description

a. Personnel Heater Assembly. The personnel heater is a multifuel heater designed to burn any hydrocarbon fuel. Mounted under the heater control cover are: a fuel control valve, to regulate the fuel flow into the heater; a preheater resistor, to preheat the fuel entering the heater; an ignitor, to ignite the fuel; and a flame detector, to shut off the preheater and ignitor once flame has been established. Air is drawn in through the top of the heater and circulated through the heater, the hot gases are exhausted through an exhaust tube, and the heated air is blown through the bottom of the heater.

b. Fuel System. An electric fuel pump, mounted on the left sponson close to the heater, draws fuel from the carrier fuel tank and pumps fuel to the heater control valve.

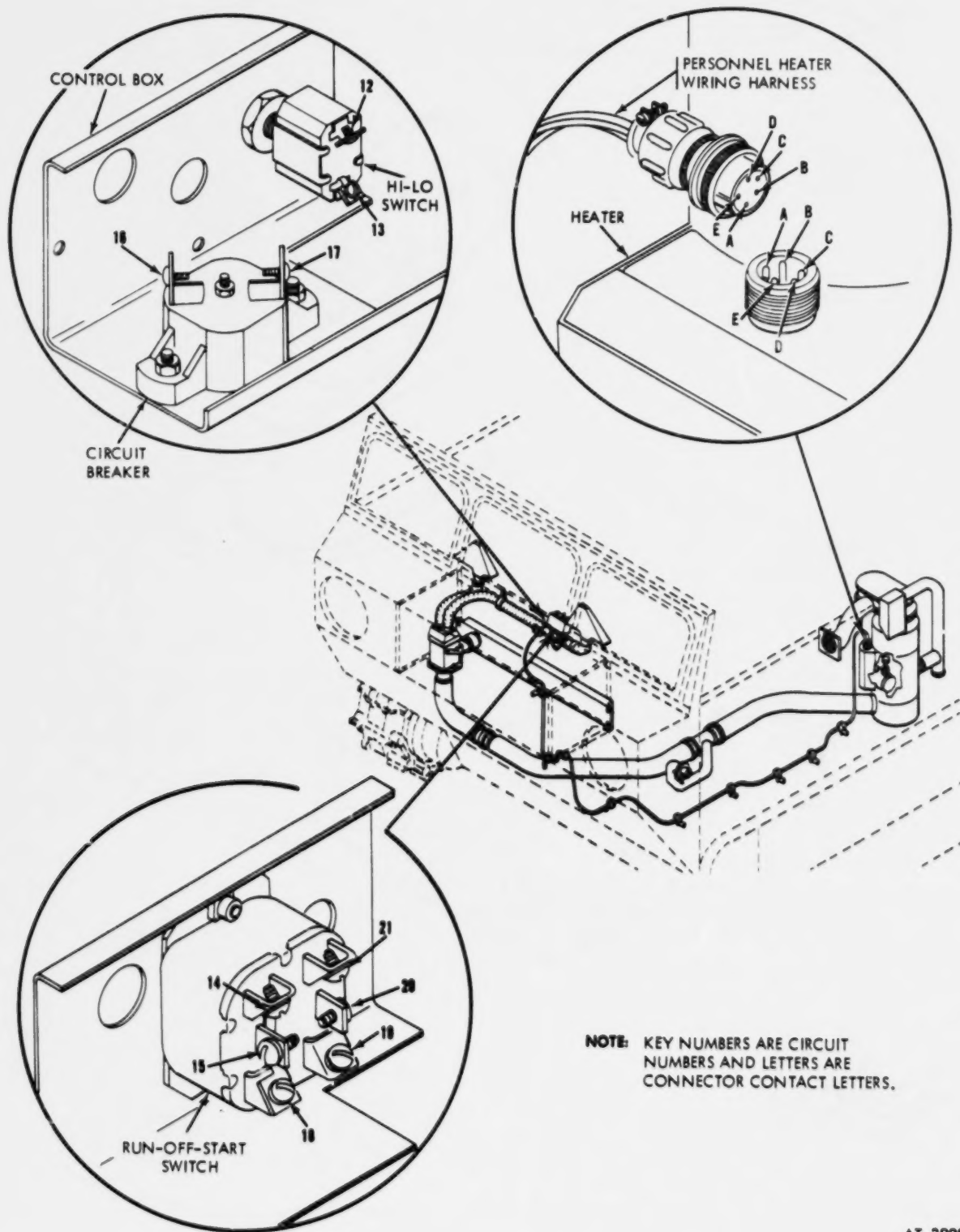
c. Exhaust System. Hot gases exhausted from the heater are expelled through the connecting exhaust pipes into air chamber welded to the hull. The air chamber encloses an opening in the hull which is an outside exit for the gases.

d. Electrical System (fig. 3-1 through 3-3). The personnel heater control box, mounted in the cab, supplies power to the electric fuel pump and heater through a wiring harness connected to the control box. Power is supplied to the control box from a connection made to the carrier main wiring harness. Two defroster fans supply warm air for defrosting the windshield. A control panel with two switches, one for each fan is installed in the cab. A defroster fan wiring harness connects to the switches, fans, and to the main wiring harness.



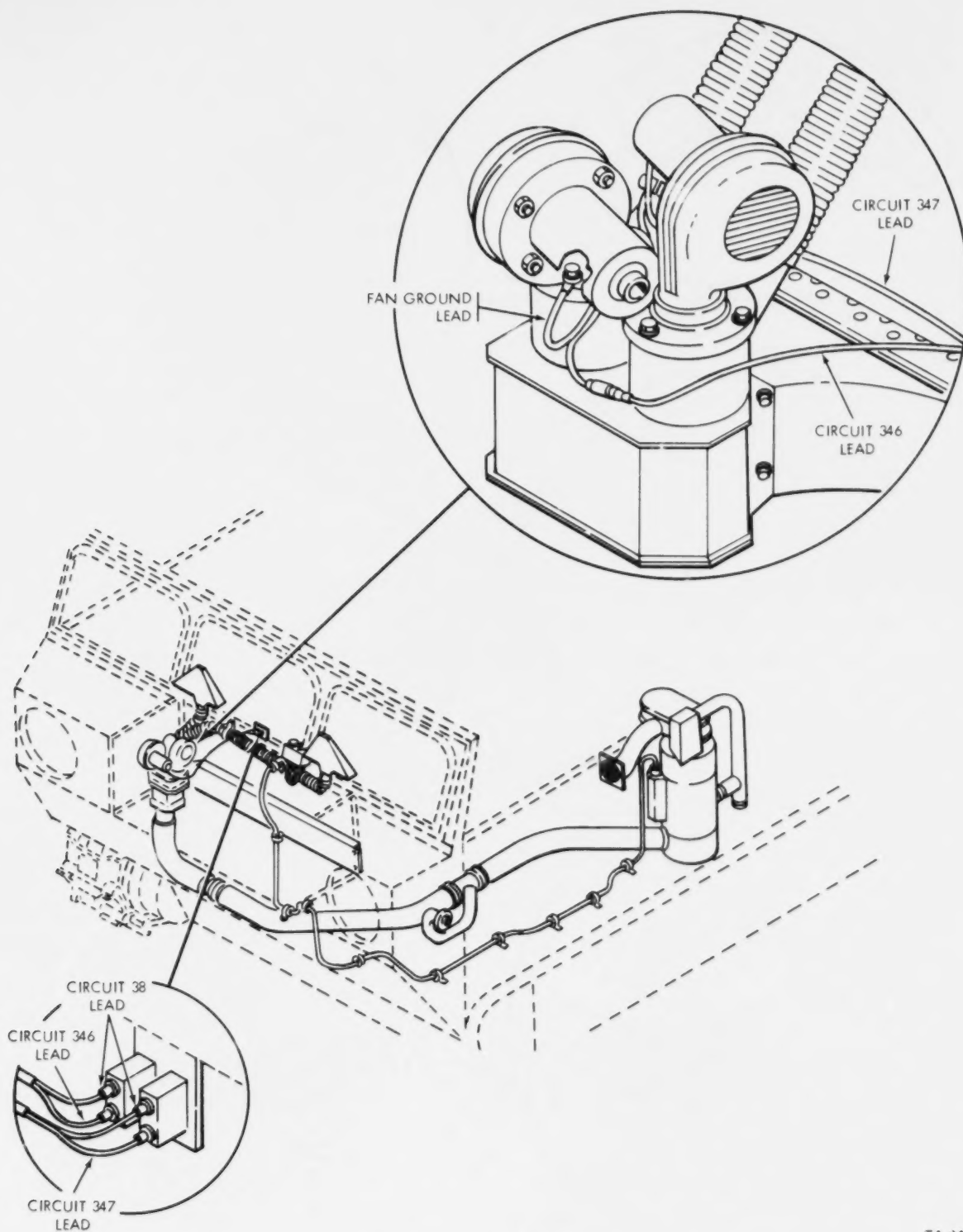
AT 3908

Figure 3-1. Personnel heater electrical system (sheet 1 of 3).



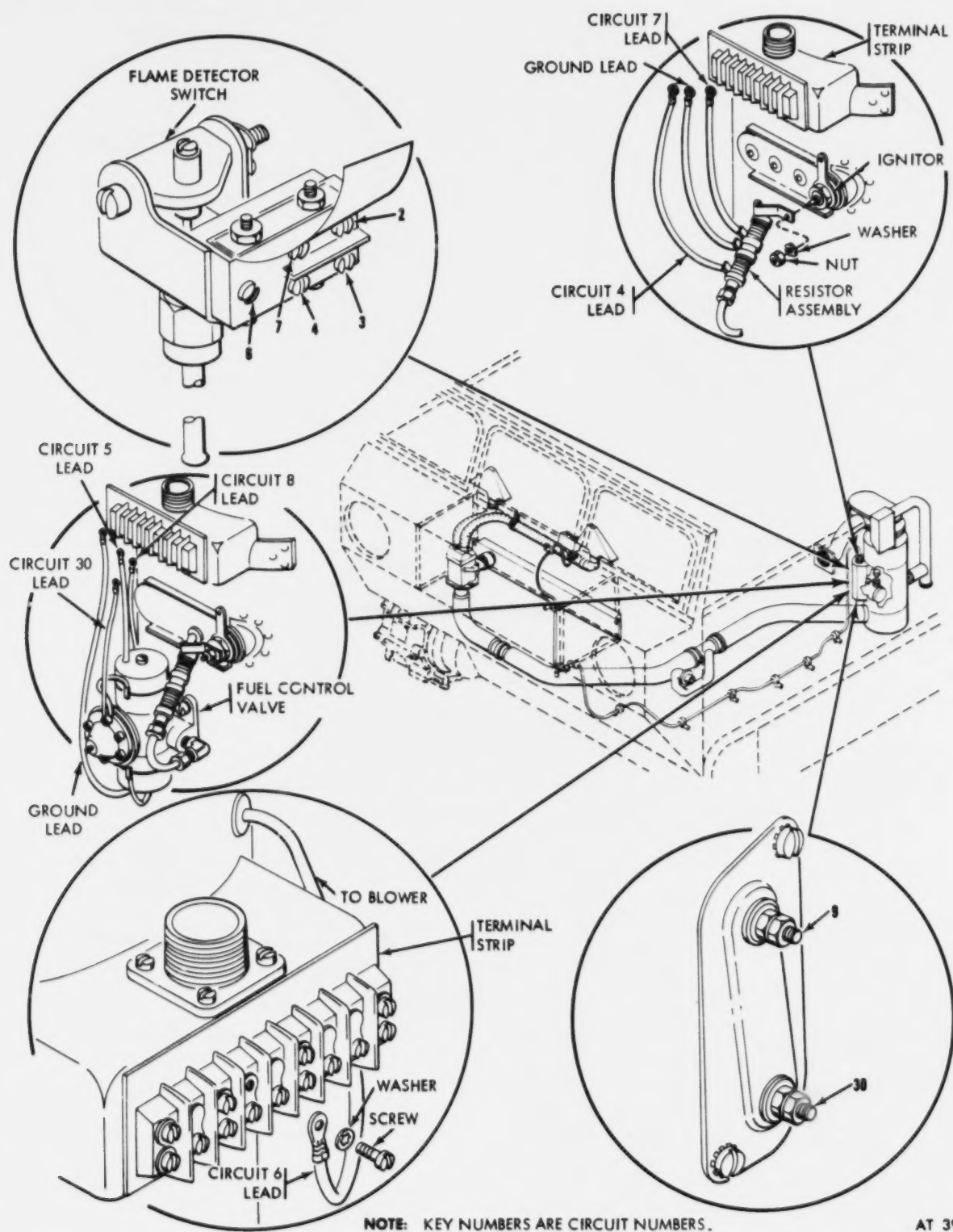
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Figure 3-1. Personnel heater electrical system (sheet 2 of 3).



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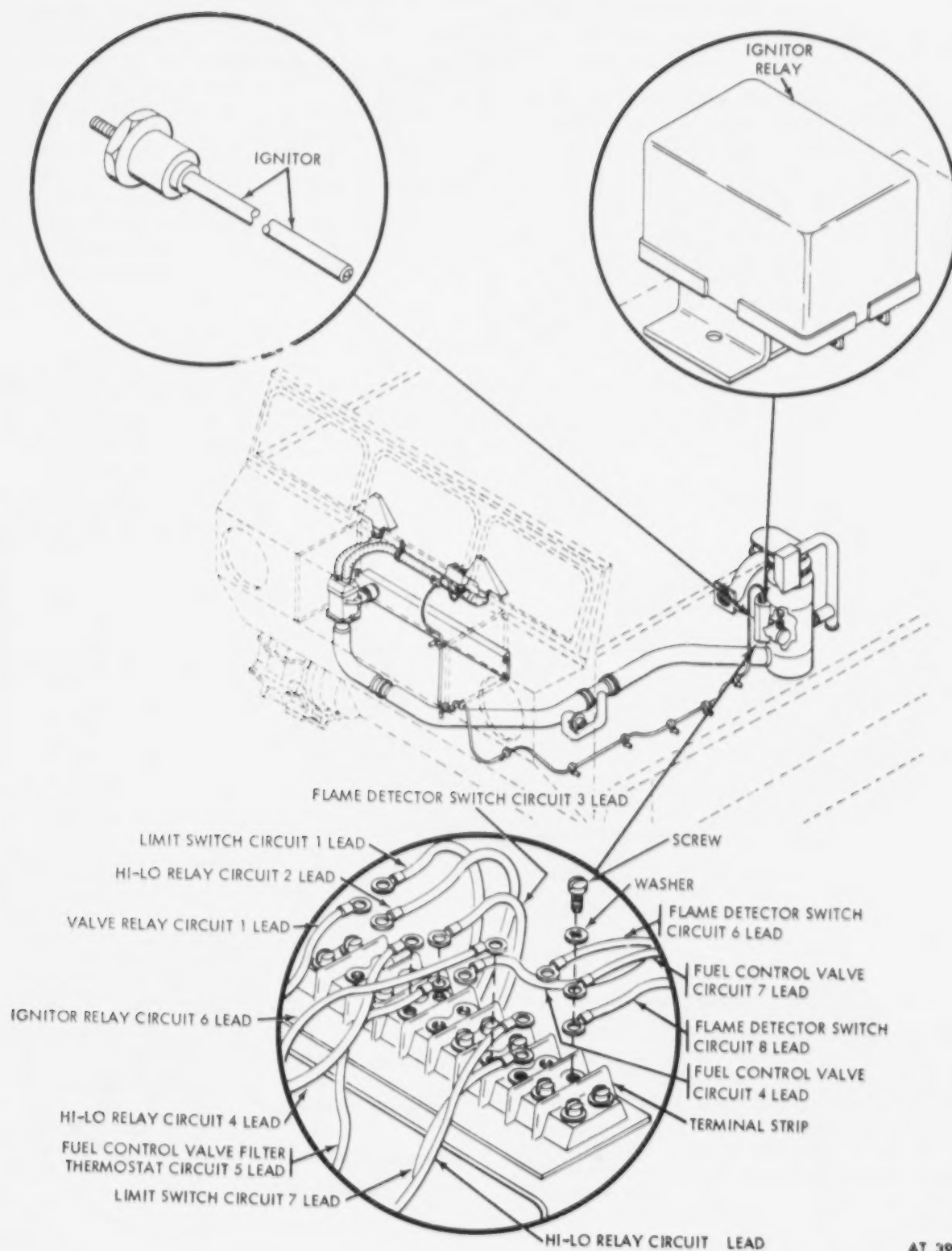
Figure 3-1. Personnel heater electrical system (late model) (sheet 3 of 3).



AT 3910

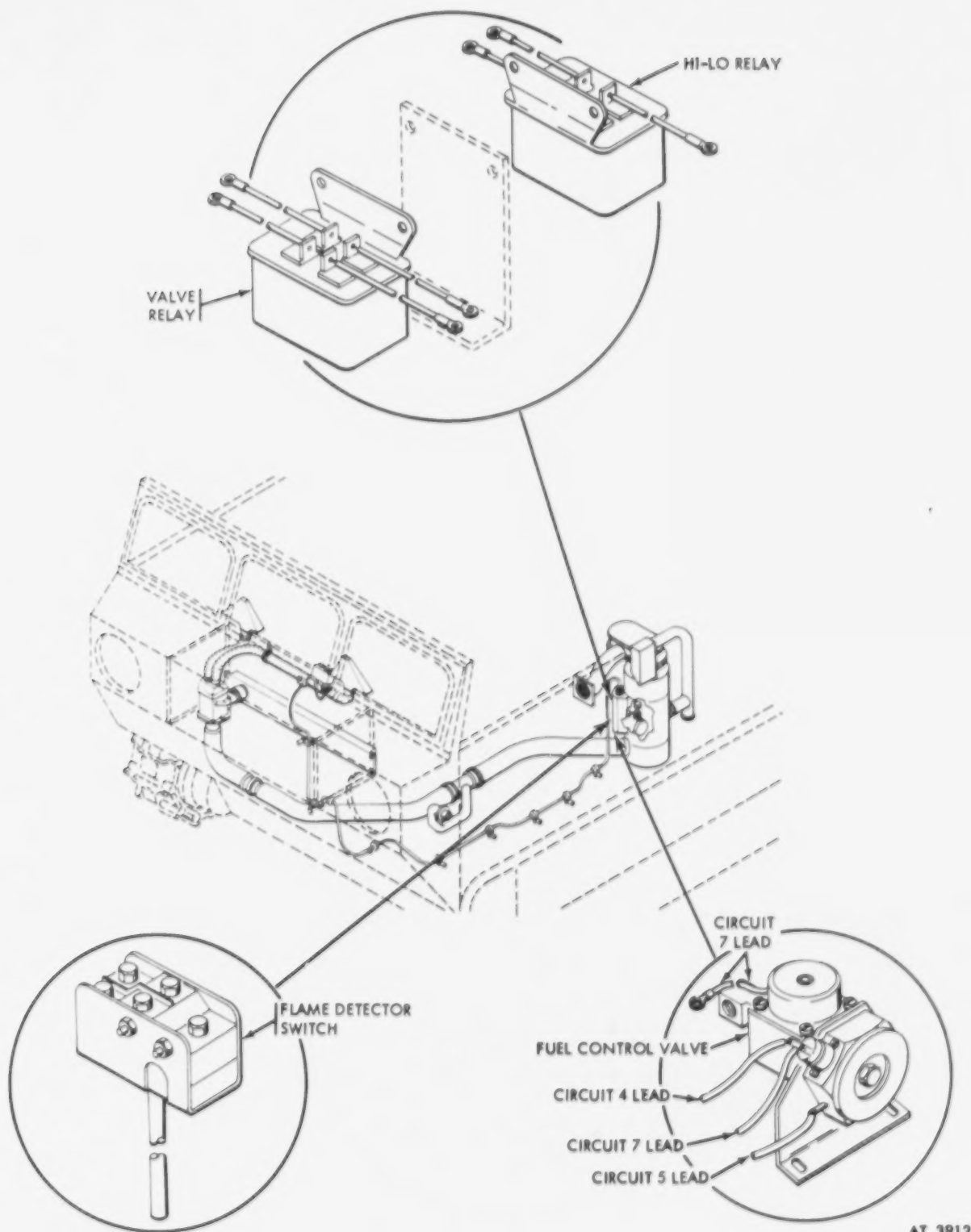
Figure 3-2. Personnel heater 7748716 (19207) electrical system.

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AT 3911

Figure 3-3. Personnel heater 11601809 (19207) electrical system (sheet 1 of 2).



AT 3912

Figure 3-3. Personnel heater 11601809 (19207) electrical system (sheet 2 of 2).

e. Air Circulating System. The personnel heater system provides heated air to the driver's cab by drawing fresh air from behind the driver's seat through an air intake hose, heating it, and circulating the heated air from the heater duct through a flexible hose to the air regulator, located on a shelf in the front of the driver's cab. A control handle on the regulator directs the heated air either to the defroster, located on the windshield, or to the distribution duct in the driver's cab. A bypass hose connected to the heater duct provides a constant flow of heated air to the driver's feet during operation of the heater.

Table 3-1. Personnel Heater Tabulated Data

<i>a. Heater.</i>	
Ordnance number (Model C)	11668862 (19207)
Manufacturer	Stewart-Warner Corporation
Model number	10560B24
Ordnance number (Perfection)	11601809 (19207)
Manufacturer	Hupp Corporation
Model number	MF501A
Operating voltage	20 to 28.5 vdc
Current consumption (above 45°F):	
Start:	
South Wind	13 amp
Perfection	15 amp
Run:	
South Wind	10 amp
Perfection	9.5 amp
Current consumption (below 45°F):	
Start:	
South Wind	17 amp
Perfection	19.5 amp
Run:	
South Wind	16 amp
Perfection	17 amp
Heat output:	
High heat	60,000 btu/hr
Low heat	30,000 btu/hr
Temperature rise over surrounding air at heater outlet (minimum):	
High heat	250°F.
Low heat	110°F.
Fuel pressure requirement	3 to 15 psi
Overheat switch setting (maximum)	475°F.
Height	24½ in.
Diameter (nominal)	8 in.
Width (maximum)	13 in.
Weight:	
South Wind	32.75 lb
Perfection	31 lb
<i>b. Fuel Pump</i>	
Part number	MS51321-2 (96906)
Output pressure	6½ to 7¼ psi

3-3. Tabulated Data

Refer to table 3-1 for tabulated data pertaining to the personnel heater.

3-4. Service upon Receipt of Materiel

a. General. Inspect the materiel to be sure it is in condition for use. Clean and prepare the materiel for service. Make a record of any missing or damaged parts and of any malfunctions. Correct deficiencies. Report serious deficiencies, which involve unsatisfactory design or material, on DA Form 2407.

c. Control Box.

Ordnance number 77488721 (19207)
Ordnance number (optional control box) 10947220 (19207)

d. Fuel.

Usable fuel DF2, DFA, JP4, JP5 & gasoline
temperatures down to the cloud point of the fuel, except DFA down to - 60°F

b. Specific Procedures.

- (1) Inspect all assemblies, subassemblies, and components to be sure they are properly assembled and secured.
- (2) Perform the before-operation checks and services (TM 9-1450-585-10).
- (3) Perform the quarterly preventive-maintenance checks and services (para 3-5).
- (4) Perform the after-operation checks and services (TM 9-1450-585-10).

3-5. Preventive-Maintenance

Preventive-maintenance checks and services for the personnel heater are listed in table 3-2. Detailed procedures to be followed and certain specific items to be checked are included for each item.

3-6. Troubleshooting

a. General. This paragraph contains troubleshooting information and tests for locating and correcting troubles which may develop in the personnel heater. Each symptom of trouble or malfunction given for an individual unit or system is followed by a list of probable causes of the trouble and corrective actions necessary to remedy the malfunction.

Table 3-2. Personnel Heater Preventive-Maintenance Checks and Services

Organizational Quarterly			
Sequence no.	Item to be inspected	Procedures	Paragraph reference
1	Fuel system	Tighten connection that shows evidence of leaks. Service fuel pump. Replace defective fuel pump.	Para 3-9 and 3-10.
2	Electrical system	Tighten electrical connection. Tape frayed harness, and replace missing or defective connectors. Secure, repair, or replace lamp, light, and switches that are inoperative, damaged, or insecurely mounted.	Para 3-21 through 3-24.
3	Personnel heater	Tighten loose mounting screws and clamps. Clean debris from heater inlet. Inspect ignitor and flame detector switch. Adjust switch if necessary. Replace damaged or inoperative ignitor or switch.	Para 3-8, 3-13, and 3-14.
4	Exhaust system	Remove and clean moisture trap. Tighten mounting screws and clamps if there is evidence of exhaust leakage. Replace components that show deterioration.	Para 3-8.
5	Air circulating system	Tighten loose mounting screws and clamps. Remove any debris from air inlet and duct outlets, and check operation of manifold or regulator valve.	Para 3-11.
5.1	Defroster fans	Tighten clamps that hold the defroster hoses to the defrosters and to the regulator. Operate the defroster fans and be sure enough air flows through ducts to the windshield. Replace damaged or inoperative parts.	Para 3-11, 3-13.1, and 3-13.2
6	Performance test	Start, run, and stop heater (TM 9-1450-585-10). During starting cycle, check for correct operation of switches and light and for increase in blower speed after ignition. During operation, check for unusual noises and noticeable difference between high and low heat levels. When stopping heater, check for correct purge cycle and operation of indicator light.	Para 3-9 and 3-10.

Organizational Semi-Annually

1	Ignitor	Remove ignitor with lead connected. Disconnect fuel shutoff solenoid lead from terminal 30 on overheat switch. Move control switch to start and hold it until ignitor glows.	Para 3-13.01
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Organizational Annually

1	Ignitor	See ignitor above.	Para 3-13.01
2	Flame Detector Switch	Remove switch and rod. Invert and rap the side of tube with screwdriver blade. Continue rapping until no oxides fall from tube.	Para 3-14

b. **Troubleshooting Table.** Table 3-3 lists possible malfunctions (symptoms), probable causes, and corrective action (remedies) that can be performed by organizational maintenance personnel. Probable causes are listed in their order of probability and should be checked in that order during troubleshooting. Refer to TM 9-1450-585-10 for operational troubleshooting.

3-7. Electrical Troubleshooting

a. **General.** This paragraph detailed troubleshooting and test information for locating and

correcting some of the troubles which may develop in the personnel heater electrical system.

b. **Circuit Diagram (Heater 11668862 (19207)).** See figure 3-4 for circuit diagram.

c. **Circuit Diagram (Heater 11601809 (19207)).** See figure 3-5 for circuit diagram.

d. **Circuit Numbers (Heater 11668862 (19207)).** Refer to table 3-4 for list of electrical circuit numbers with brief circuit-tracer description of each number. The electrical leads are marked with circuit number band attached to the junction of each lead.

Table 3-3. Personnel Heater Troubleshooting

Malfunction	Probable Cause	Corrective Action
1. Heater fails to start with run-off-start switch in START position.	a. Lack of fuel..... b. Loose electrical connections or defective electrical system. c. Burned out ignitor..... d. Maladjusted or defective flame detector switch. e. Discharged or defective carrier batteries. f. Defective internal heater component...	a. (1) Service fuel pump strainer (para 3-9). (2) Check fuel pump pressure (para 3-9). Replace fuel pump if defective (para 3-9). (3) Check for clogged or restricted fuel lines. Disconnect clogged or restricted lines (para 3-10) and blow lines out with compressed air. If air does not flow through freely, replace defective fuel line (para 3-10). b. Check connections at control box heater and fuel pump. If above does not remedy malfunction, troubleshoot electrical system (para 3-7). c. Replace defective ignitor (para 3-13). d. Adjust or replace flame detector switch (para 3-14). e. Check batteries (para 2-99). Recharge or replace batteries. f. Replace heater (para 3-8).
1.1 Heater fails to start — motor does not run.	a. No power..... b. Loose electrical connections or defective electrical system.	a. Depress PRESS TO TEST lamp. b. Check power at terminals 2 and 3 on heater with switch in START position. No power indicates defective cable or connectors between control box and heater.
1.2 Heater fails to start — motor runs.	a. Flame detector switch defective..... b. Ignition control defective..... c. Ignitor defective..... d. Overheat switch defective..... e. Fuel supply malfunction..... f. Fuel control valve defective..... g. Fuel tube or burner defective.....	a. Check power at NO terminals with control switch in START position. If power at only one terminal, remove and inspect switch. b. Check power at ignitor terminal with control switch in START position. If no power, replace ignitor control. c. Remove ignitor and inspect with control switch in START position. d. Check power at terminal 30 with control switch in START position. e. Check power at terminal A on control box with control switch in START position. Check fuel pump operation. Check fuel lines. f. Loosen fitting at fuel control valve, move control switch to START position. If fuel supply is good, notify direct support personnel. g. Notify direct support personnel.

Table 3-3. Personnel Heater Troubleshooting — Continued

Malfunction	Probable Cause	Corrective Action
1.3 Heater fails to start — motor runs — white fuel vapor at exhaust.	a. Ignitor weak or not properly seated. b. Burner flooded.	a. See step 1.2c. b. If wick is wet, reinstall the ignitor and disconnect the shutoff solenoid lead at terminal 30 on overheat switch. Hold the control switch in START position for several minutes.
1.4 Heater cycles on overheat switch.	a. High ambient air temperature b. Low voltage c. Restricted ventilating air flow	a. No repair necessary. b. Check voltage input. c. Clean and repair blower inlet and ducts.
1.5 Smoke exhaust.	a. Low supply voltage b. Restricted exhaust c. Restricted combustion air inlet d. Incorrect fuel flow rate e. Defective burner f. Defective blower motor g. Heat exchanger restricted with soot and carbon.	a. Check voltage of hot lead to control box. b. Clean or repair exhaust as necessary. c. Check combustion air inlet for dirt or damage. d. If fuel supply and pump are good, notify direct support personnel. e. Notify direct support personnel. f. Notify direct support personnel. g. Notify direct support personnel.
2. Heater overheats and stops burning.	a. Restricted intake or ventilation air flow, or restricted exhaust. b. Defective internal heater component.	a. Remove restriction. b. Replace heater (para 3-8).
3. Heater overheats and continues to burn.	Defective internal heater component and possible restriction in intake or ventilation air flow, or in exhaust.	Replace heater (para 3-8) and remove any air flow or exhaust restriction.
4. Heater output too low.	a. Low fuel flow b. Loose electrical connections, or defective electrical system. c. Defective burner d. Fuel control valve defective or dirty.	a. Refer to item 1 above. b. Check connections at control box, heater, and fuel pump. If above does not remedy malfunction, troubleshoot electrical system (para 3-7). c. Notify direct support personnel. d. Check fuel flow rate. Notify direct support personnel.
5. Heater smokes excessively or "bangs" on starting.	Loose electrical connections or defective internal heater component.	Check electrical connections at heater and control box. If above does not remedy malfunction, replace heater (para 3-8).
NOTE Heater will smoke on starting when burning DF2.		
6. Heater does not stop when run-off-start switch is placed in OFF position.	a. Defective run-off-start switch b. Defective internal heater component.	a. Replace run-off-start switch (para 3-21). b. Replace heater (para 3-8).
7. With heater shut down, blower continues to operate beyond normal purge cycle (3½ minutes max).	Maladjusted or defective flame detector switch.	Adjust or replace flame detector switch (para 3-14).
8. Fuel odor in ventilation air.	Leaking fuel lines or connections at fuel control valve on heater.	Tighten fuel line connections. If above does not remedy malfunction, replace heater (para 3-8).

e. *Circuit Numbers (Heater 11601809 (19207)).*
Refer to table 3-5 for list of electrical circuit numbers
with brief circuit-tracer description of each number.

The electrical leads are marked with a circuit number
band attached to the junction of each lead.

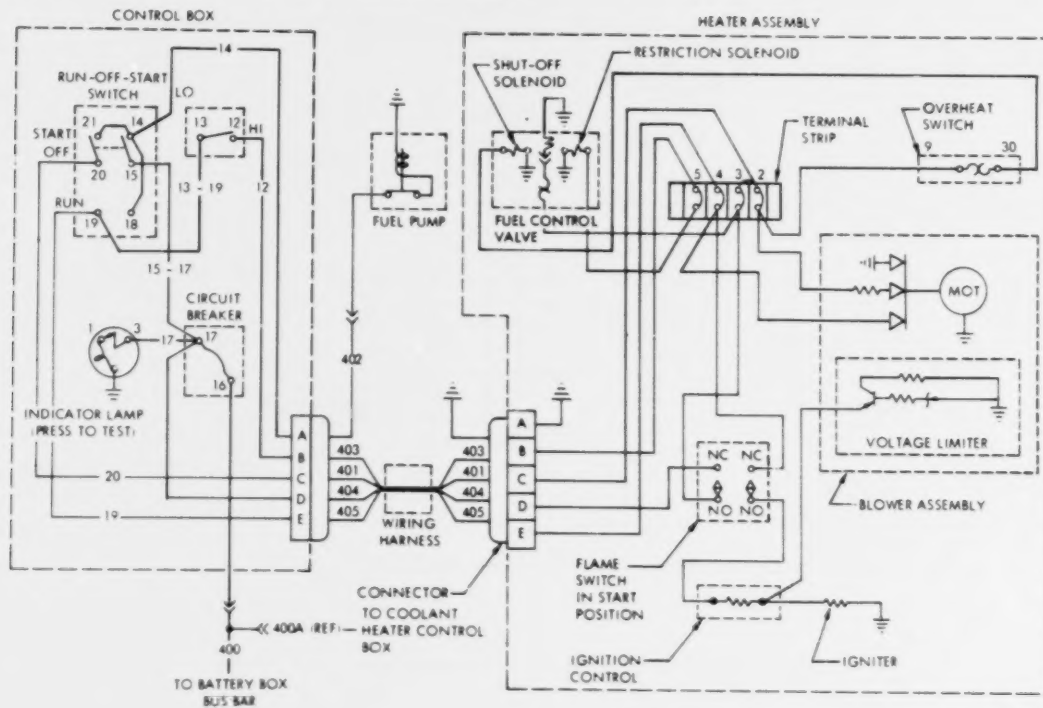
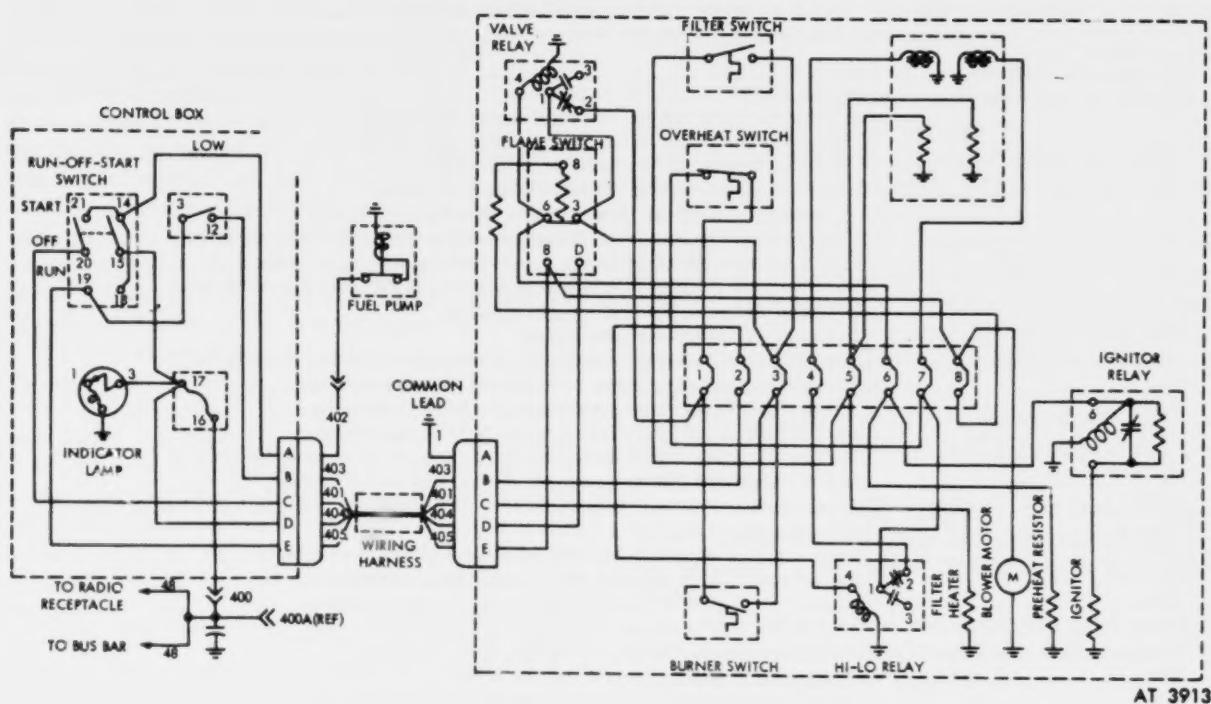


Figure 3-4. Personnel heater 11668862 (19207) circuit diagram.

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AT 3913

Figure 3-5. Personnel heater 11601809 (19207) circuit diagram.

f. Electrical Test Equipment. See figure 2-5 for electrical test equipment and method of performing electrical test specified in electrical troubleshooting table.

g. Physical Description (Heater 11668862 (19207)). A run-off-start switch and a hi-lo switch, contained in a control box in the cab, control operation of an electric fuel pump, located on left sponson below heater, and the electrical components of the heater assembly. A circuit breaker in the control box protects the electrical components of the heater assembly, and an indicator light indicates when the heater has started or is running. Contained in the heater assembly are a

fuel control valve, to regulate the flow of fuel to the combustion chamber; an ignitor, to ignite the fuel during the starting cycle; a flame detector switch, to shut off the ignitor, speed up the blower, and turn on the indicator light when the heater has started; an overheat switch, to shut off the heater if it becomes overheated; and a terminal strip, to distribute electrical current to the various electrical components. The control box and the heater assembly are connected by a heater wiring harness. The control box is connected to the fuel pump and the carrier distribution box by leads in the carrier main wiring harness.

Table 3-4. Personnel Heater 11668862 (19207) Electrical Circuit Numbers

Number	Description
A	Heater connector pin "A" to ground.
B	Heater connector pin "B" to terminal strip terminal 5.
C	Heater connector pin "C" to terminal strip terminal 2.
D	Heater connector "D" to flame detector switch.
E	Heater connector pin "E" to terminal strip terminal 4.
2	Terminal strip terminal 2 low motor to terminal strip terminal 3.
3	Heater connector pin "D" to flame detector switch to fuel control valve.
4	Flame detector switch to terminal strip terminal 4 to high motor.
5	Terminal strip terminal 5 to heater connector pin "B" to fuel control valve.
9	Overheat switch to terminal strip terminal 2.
30	Overheat switch to fuel control valve.
13-19	Jumper from hi-lo switch terminal 13 to run-off-start switch terminal 19.
14	Run-off-start switch terminal 14 to control box connector pin "A".
14-18	Jumper from run-off-start switch terminal 14 to terminal 18.
14-21	Jumper from run-off-start switch terminal 14 to terminal 21.
15-17	Jumper from run-off-start switch terminal 15 to circuit breaker terminal 17.
16	Carrier circuit 400 lead connector to control box circuit breaker.
17	Control box circuit breaker terminal 17 to indicator light terminal 3 and control box connector pin "D".
19	From run-off-start switch terminal 19 to control box connector pin "E".
20	Run-off-start switch terminal 20 to control box connector pin "C".
400	Battery box bus bar to control box circuit 16 lead connector.
401	Control box connector pin "C" to heater connector pin "C".
402	Control box connector pin "A" to fuel pump connector.
403	Control box connector pin "B" to heater connector pin "B".
404	Control box connector pin "D" to heater connector pin "D".
405	Control box connector pin "E" to heater connector pin "E".

Table 3-5. Personnel Heater 11601809 (19207) Electrical Circuit Numbers

Number	Description
A	Connector pin "A" to ground.
D	Connector pin "D" to flame detector switch terminal "D."
E	Connector pin "E" to flame detector switch, ignitor relay terminal "E" and ignitor.
1	Terminal strip terminal 1 to hi-lo relay terminal 2, burner thermostat and thermostat limit switch. Jumper between hi-lo relay terminal 1 and flame detector switch.
2	Connector pin "B" to terminal strip terminal 2 and valve relay terminal 4.
4	Terminal strip terminal 4 to valve relay terminal 2 and regulator valve. Jumper between hi-lo relay terminal 4 and flame detector switch.
5	Terminal strip terminal 5 to valve thermostat and regulator valve filter.
6	Terminal strip terminal 6 to ignitor relay terminal 6 to preheat resistor, and flame detector switch.
7	Terminal strip terminal 7 to valve relay terminal 1 and thermostat limit switch and regulator valve.
8	Terminal strip terminal 8 to blower motor resistor, blower motor, and flame detector switch.
13-19	Jumper from hi-lo switch terminal 13 to run-off-start switch.
14	Run-off-start switch to control box connector pin "A."
14-18	Jumper from run-off-start switch terminal 14 to 18.
14-21	Jumper from run-off-start switch terminal 14 to 21.
15-17	Jumper from run-off-start switch terminal 15 to circuit breaker.
16	Carrier circuit 400 lead connector to control box circuit breaker.
17	Control box circuit breaker to indicator light terminal 3 and control box connector pin "D."
19	From indicator light terminal 2 to run-off-start switch to control box connector pin "E."
20	Run-off-start switch to control box connector pin "C."
30	Overheat switch to fuel control valve.
400	Battery box bus bar to control box circuit 16 lead connector.
401	Control box connector pin "C" to heater connector pin "C."
402	Control box connector pin "A" to fuel pump connector.
403	Control box connector pin "B" to heater connector pin "B."
404	Control box connector pin "D" to heater connector pin "D."
405	Control box connector pin "E" to heater connector pin "E."

h. Physical Description (Heater 11601809 (19207)). A run-off-start switch and a hi-lo switch, mounted in the control box in the cab, control operation of an electric fuel pump and the electrical components of the heater. A circuit breaker in the control box protects the electrical components of the heater assembly, and an indicator light indicates when the heater has started or is running. A fuel control valve regulates the flow of fuel to the heater. A thermostatic filter switch and filter heater in the control valve filter and a shutoff heater and restriction heater in the control valve heat the fuel when the surrounding temperature is below 30°F., for accurate metering. A preheat resistor, ignitor relay, and glow-plug ignitor supply heat to vaporize and ignite the fuel. The ignitor relay protects the ignitor from voltages in excess of 25 volts, to prolong ignitor life. The thermostatic burner switch and valve relay isolate the shutoff solenoid in the control valve and prevent flow of fuel during the preheat cycle. When the ignitor and preheater have heated the burner plate in the heater combustion chamber to 235° to 265°F., the burner switch closes and energizes the shutoff solenoid and restriction solenoid, permitting low heat fuel flow immediate ignition. A flame detector switch in cold position energizes the valve relay, preheater, ignitor relay and ignitor, a motor resistor, and a blower motor. When the flame detector switch transfers, the valve relay is de-energized and the shutoff solenoid is energized through the normally closed valve relay and the closed burner switch, the preheater, ignitor relay and ignitor are de-energized, the motor resistor is bypassed, the blower operates at full speed, the indicator light glows and the hi-lo switch is energized. If the hi-lo switch is in H1 position, the hi-lo relay is energized, de-energizing the normally open restriction solenoid and permitting high heat fuel flow.

i. Functional Description (Heater 11668862 (19207)).

NOTE

On early model M730 vehicles it may be necessary to turn master switch on to operate heater. On late model M730 and all M730A1 it is not necessary to turn master switch on.

(1) With the run-off-start switch held in START position, the condition of the electrical system is as follows:

- (a) Control box circuit breaker is closed.
- (b) Indicator light is de-energized (press-to-test circuit operative only).

(c) Terminal 15 of run-off-start switch is energized from circuit breaker.

(d) Hi-lo switch is de-energized.

(e) Fuel pump is energized from run-off-start switch through circuit 402 lead.

(f) Terminal 2 of heater terminal strip is energized from run-off-start switch through circuit 401 lead and connector "C".

(g) The ignitor is energized from terminal 2 of terminal strip through jumper to terminal 3 of terminal strip then through the flame detector switch and ignition control to the ignitor. Voltage to the ignitor is controlled by the solid-state voltage limiter located in the blower assembly.

(h) Shutoff solenoid of fuel control valve is energized through overheat switch from terminal 2 of terminal strip.

(i) Blower motor receives reduced voltage from terminal 2 of the terminal strip through a resistor mounted in the blower housing, and runs at low speed.

(j) Restriction solenoid in the fuel control valve is not energized and fuel flows to the heater at a low rate to saturate the ignitor wick.

(k) Ignitor element glows and ignites the burner. Heat from exhaust gases then trips the flame detector switch.

(2) With the run-off-start switch in RUN position and the heater running, the condition of the electrical system is as follows:

(a) Circuit breaker is closed.

(b) Indicator lamp is energized.

(c) Terminal 15 of run-off-start switch is energized from circuit breaker.

(d) Fuel pump is energized from run-off-start switch through circuit 402 lead.

(e) When the flame detector switch trips, it breaks the circuit to the ignitor. Full voltage from connector terminal "D" through terminal 4 on the terminal strip to the motor is applied. This increases the motor speed to operating range.

(f) Connector terminal "D" is always energized. The power flows through the flame detector switch "NC" and terminal 4 on the terminal strip, then back through terminal connector "E" to the run-off-start switch.

(g) Terminal 19 on the switch is closed to terminal 20 when the run-off-start switch is in the RUN position. This supplies power to connector terminal "C" through terminal 2 on the terminal strip and the overheat switch. This energizes the shut-off solenoid and maintains fuel flow.

j. Functional Description (Heater 11601809 (19207)).

NOTE

On early model M730 vehicles it may be necessary to turn master switch on to operate heater. On late model M730 and all M730A1 vehicles, it is not necessary to turn master switch on.

(1) With the run-off-start switch held in START position, the condition of the electrical system is as follows:

- (a) Control box circuit breaker is closed.
- (b) Indicator light is de-energized (press-to-test circuit operative only).

(c) Terminal 15 of run-off-start switch is energized from circuit breaker.

(d) Hi-lo switch is de-energized.

(e) Fuel pump is energized from run-off-start switch through circuit 402 lead.

(f) Terminal 3 of the heater terminal board is energized from run-off-start switch through circuit 401 lead.

(g) Burner switch is energized from terminal 3 of the terminal board, but remains open until preheat cycle is complete.

(h) Filter switch is energized from terminal 3 of the terminal board, and filter heater, shutoff heater, and restriction heater are energized or de-energized depending on condition of filter switch.

(i) Flame detector switch is energized from terminal 3 of terminal board.

(j) Valve relay terminal 4 is energized through flame detector switch and relay is open.

(k) Blower is energized at low speed through motor resistor and flame detector switch in cold position.

(l) Preheat resistor, ignitor relay, and ignitor are energized from flame detector switch in cold position.

(m) Ignitor relay is closed if applied potential is less than 25 vdc, or open if potential is more than 25 vdc.

(n) When burner switch closes at end of preheat portion of starting cycle, normally closed shutoff solenoid is energized through overheat switch and normally open restriction solenoid is energized through overheat switch and closed hi-lo relay.

(2) With the run-off-start switch in RUN position and the heater running, the condition of the electrical system is as follows:

(a) Circuit breaker is closed.

(b) Indicator lamp is energized.

(c) Terminal 15 of run-off-start switch is energized from circuit breaker.

(d) Fuel pump is energized from run-off-start switch through circuit 402 lead.

(e) Flame detector switch is energized from circuit breaker through circuit 404 lead.

(f) Blower is energized at high speed through flame detector switch in hot position.

(g) Terminal 19 of run-off-start switch is energized from flame detector switch through circuit 405 lead.

(h) Terminal 3 of terminal board is energized from run-off-start switch through circuit 401 lead.

(i) Burner switch is open or closed, depending on temperature of intake air passing over switch.

(j) Terminal 4 of valve relay is de-energized (flame switch in hot position) and relay is closed.

(k) Shutoff solenoid and terminal 1 of hi-lo relay are energized through closed valve relay and overheat switch.

(l) Terminal 13 of hi-lo switch is energized.

(m) Terminal 4 of hi-lo relay is de-energized with hi-lo switch in LO position, or energized through circuit 403 lead with hi-lo switch in HI position.

(n) Due to reversing action of hi-lo relay, normally open restriction solenoid is energized with hi-lo switch in LO position or de-energized with hi-lo switch in HI position.

(o) Filter switch is energized from terminal 3 of terminal board, and filter heater, shutoff heater, and restriction heater are energized or de-energized depending on condition of filter switch.

(p) Preheat resistor, ignitor relay, and ignitor are de-energized.

k. Troubleshooting.

(1) Refer to table 3-6 and figures 3-1 and 3-2 for troubleshooting personnel heater 11668862 (19207) which lists possible malfunction (symptoms), probable causes (tests), and corrective action (remedies) that can be performed by organizational maintenance personnel.

(2) Refer to table 3-7 and figures 3-1 and 3-3 for troubleshooting personnel heater 11601809 (19207).

3-8. Personnel Heater

(fig. 3-6)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Loosen two clamps (10), and remove exhaust pipe (11) from heater assembly (9) and air chamber (12).

(3) Disconnect fuel pump-to-heater hose assembly (4) from heater assembly (9).

Table 3-6. Personnel Heater 11668862 (19207) Electrical System Troubleshooting

Personnel heater system malfunction	Test
1. Heater fails to start — motor does not run.	Test 1. Depress press-to-test cover on indicator light. If lamp does not glow, perform tests 2 through 6. If lamp glows, perform tests 7 through 10.
	Test 2. Disconnect circuit 400 lead from control box, and check for power to control box.
	Test 3. Test lamp. Check resistance from center contact to metal body of lamp. If reading indicates some resistance, lamp is good. If reading is infinity, replace lamp (para 3-23).
	Test 4. Disconnect indicator light circuit 17 lead from circuit breaker and circuit 19 lead from run-off-start switch. Check resistance from circuit 19 lead terminal through light to ground and from circuit 17 lead terminal, with cover pushed in, through light to ground. Reading should indicate some resistance. If reading is infinity or 0 ohms, replace defective light (para 3-24). Check resistance from circuit 17 lead terminal, with cover out, through light to ground. If reading is infinity, light is good. If there is any measurable resistance, replace defective light (para 3-24).
	Test 5. Disconnect circuit 16 and 17 leads from circuit breaker. Put probes on circuit breaker terminals to read through circuit breaker. Reading should be 0 ohms. If reading is infinity, replace defective circuit breaker (para 3-25).
	Test 6. Disconnect circuit 16 lead from circuit 400 lead and circuit breaker. Put probes on lead ends to read through lead. If reading is 0 ohms, lead is good. If reading is infinity, replace defective lead (para 3-25).
	Test 7. Disconnect wiring harness receptacle from control box. Hold run-off-start switch in START position. Use a test light to check for power to A, C, and D pins in receptacle on control box. If there is no power to one or more of these terminals, either switch or wiring is at fault. Replace defective switch or wiring (para 3-21). If there is power, perform test 8.
	Test 8. Hold run-off-start switch in START position and check for power at terminals 2 and 3 on the terminal strip. If there is no power, check wiring harness for continuity and replace if defective. If there is power at the terminals then the problem is in the resistor motor wiring, motor, or motor ground. Replace heater (para 3-8).
	Test 9. Disconnect circuit 14, 13-19, 15-17, and 20 leads from run-off-start switch. Hold switch in START position. Place one probe on terminal 15 and the other, in succession, on terminals 14, 18, 20, and 21 and check resistance. Reading should be 0 ohms. If any reading is infinity, replace defective switch (para 3-21).
	Test 10. Disconnect circuit 14, 13-19, 15-17, 19, and 20 leads from run-off-start switch. Place switch in RUN position. Place one probe on terminal 15 and the other, in succession, on terminals 18, 14, 21, 19, and 20 and check resistance. Reading should be 0 ohms. If any reading is infinity, replace defective switch (para 3-21).
2. Heater fails to start — motor runs.	Test 1. Hold run-off-start switch in START position and check for power at both NO terminals on flame detector switch. If there is no power to either NO terminal, wiring from terminal strip is defective. Replace heater. If there is power to only one NO terminal, flame detector switch is defective. Replace switch (para 3-14).
	Test 2. If flame detector switch is good (test 1) hold run-off-start switch in START and check for power at ignitor and voltage limiter terminals on ignition control. If there is no power, replace ignition control (para 3-20).
	Test 3. If ignition control is good (Test 2), inspect ignitor and ignition wick (para 3-12.01). Replace the ignitor if defective (para 3-23.1). Replace heater if wick is defective.

Table 3-6. Personnel Heater 11668862 (19207) Electrical System
Troubleshooting — Continued.

Personnel heater system malfunction	Test
2. Continued	Test 4. Hold the run-off start switch in START position and check for power at terminal 30. If there is no power, remove and inspect overheat switch (para 3-16). Replace if defective (para 3-16). Test 5. Loosen fuel supply line at fuel control valve IN port. Hold run-off-start switch in START position and check fuel flow. If fuel flow is erratic, bleed fuel control valve (para 3-15). If no fuel flows, perform tests 6 through 10. Test 6. Disconnect circuit 402 lead from heater fuel pump. Check resistance from circuit 402 lead through pump to ground. Reading should be 18 to 22 ohms. If reading is not in above range, replace defective fuel pump (para 3-9). Test 7. Disconnect connector plugs from control box and heater. Put probes on sockets C in connector plugs, and check resistance through lead. Reading should be 0 ohms. If reading is infinity, replace defective wiring harness (para 3-12). Test 8. Disconnect connector plugs from control box and circuit 20 lead from run-off-start switch. Place probe on connector pin C and end of circuit 20 lead, and check resistance through lead. Reading should be 0 ohms. If reading is infinity, repair lead or replace defective control box (para 3-12 or 3-21). Test 9. Disconnect connector plug from control box and circuit 402 lead from fuel pump. Place probe on jack A of connector and end of circuit 402 lead, and check resistance through lead. Reading should be 0 ohms. If reading is infinity, replace defective wiring harness (para 3-12). Test 10. Disconnect connector plug from control box and circuit 14 lead from run-off-start switch. Place probe on connector pin A and end of lead, and check resistance through lead. Reading should be 0 ohms. If reading is infinity, repair lead or replace defective control box (para 3-12).
3. Heater fails to start — motor runs; white fuel vapor at exhaust.	Test for faulty ignitor or wick. Refer to malfunction 2, test 5.
4. Heater cycles on over-heat switch.	Check if voltage input to heater is 24 volts. If voltage is low, correct power sources.
5. Low heat output	Test 1. Test fuel control valve. Refer to malfunction 2, test 5 above. Test 2. Disconnect circuit 12 lead and circuit 13-19 jumper from hi-lo switch. Place hi-lo switch in HI position, place probes on terminals 12 and 13, and check resistance through switch. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 3-22). Test 3. Test run-off-start switch. Refer to malfunction 1, test 9 above. Test 4. Disconnect connector plug from heater and circuit 5 lead from terminal strip. Place probes on connector pin B and end of circuit 5 lead, and check resistance through lead. Reading should be 0 ohms. If reading is infinity, replace heater (para 3-8). Test 5. Disconnect connector plugs from control box and heater. Place probes on jacks B, and check resistance through circuit 401 lead. If reading is 0 ohms, lead is good. If reading is infinity, replace defective wiring harness (para 3-12).
6. Smoky exhaust	Test 1. Test for low voltage, refer to malfunction 4. Test 2. Test fuel flow, refer to malfunction 2, tests 5 through 10.

Table 3-7. Personnel Heater (1601809 (19307) Electrical System Troubleshooting

Personnel heater system malfunction	Test
1. Heater fails to start with run-off-start switch in START position.	Test 1. Test 2. Test 3.
	Refer to malfunction 1, test 1, table 3-6. Refer to malfunction 1, test 2, table 3-6. Disconnect circuit 402 lead from heater fuel pump. Check resistance from circuit 402 lead through pump to ground. Reading should be 18 to 22 ohms. If reading is not in above range, replace defective pump (para 3-9). If pump is good, perform tests 21 through 23, malfunction 1, table 3-6.
	Test 4.
	Disconnect ignitor lead from ignitor. Check resistance through ignitor to ground. Reading should be 3.4 to 4.2 ohms. If reading is not in above range, replace defective ignitor (para 3-13).
	Test 5.
	Disconnect blower lead from terminal 8 of terminal strip. Check resistance through blower motor to ground. Reading should show some resistance. If reading is 0 ohms or infinity, replace heater (para 3-8).
Test 6.	Disconnect lead from terminal 6 of ignitor relay and apply 24 vdc between terminal 6 and ground (through ignitor). Check for voltage at terminal E. Reading should be 24 vdc. Apply 26 vdc to terminal 6 and check for voltage at terminal E. Reading should be 23 vdc. If any other readings are obtained, replace relay (para 3-19).

**Table 3-7. Personnel Heater 11601809 (19207) Electrical System
Troubleshooting— Continued**

Personnel heater system malfunction	Test	
1. Continued	Test 7.	Disconnect motor resistor lead from terminal 8 of terminal strip. Check for resistance across resistor. Reading should be 7.3 to 8.1 ohms. If reading is not in above range, replace heater (para 3-8).
	Test 8.	Disconnect preheat resistor lead from terminal 6 of terminal strip. Check for resistance through resistor to ground. Reading should be 3.4 to 4.2 ohms. If reading is not in above range, replace heater (para 3-8).
	Test 9.	Disconnect burner switch leads from terminals 1 and 3 of terminal strip. Check for continuity through switch. Reading should be infinity. Hold run-off-start switch in START position. Within 2 to 4 minutes, burner switch should close and reading should be zero. If readings are other than above, replace heater (para 3-8).
	Test 10.	Disconnect shutoff solenoid lead from terminal 7 of terminal strip, and restriction solenoid lead from terminal 4. Check resistance through each solenoid to ground. Reading should be 142 to 158 ohms for each solenoid. If readings are not in above range, replace heater (para 3-8).
	Test 11.	Disconnect overheat switch leads from terminals 1 and 7 of terminal strip. Check for continuity through switch. Reading should be zero. If any other reading is obtained, replace heater (para 3-8).
	Test 12.	Disconnect flame detector switch leads from terminals 3 and 6 of terminal strip. Check continuity through leads. Reading should be zero. Check continuity through terminal 3 lead to motor resistor terminal of flame detector switch. Reading should be infinity. If any other readings are obtained, adjust or replace flame detector switch (para 3-14).
	Tests 13 through 27.	Refer to malfunction 1, tests 10 through 23, table 3-6.
	Test 28.	Disconnect filter switch leads from terminals 3 and 5 of terminal strip. Check for continuity through switch. Reading should be infinity above 30° F., or zero below 30° F. If any other readings are obtained, replace heater (para 3-8).
	Test 29.	Disconnect restriction heater, shutoff heater, and filter heater leads from terminal 5 of terminal strip. Check resistance through each heater element to ground. Reading should be 14.5 to 16.1 ohms for the restriction and shutoff heaters, and 9.1 to 10.1 ohms for the filter heater. If readings are not in above ranges, replace heater (para 3-8).
2. Heater overheats and stops burning.	Test	Test fuel control valve. Refer to malfunction 1, test 10, above.
3. Heater overheats and continues to burn. .	Test	Test overheat switch and fuel control valve. Refer to malfunction 1, tests 10 and 11, above.
4. Heater output too low	Test 1.	Test fuel control valve. Refer to malfunction 1, test 10, above.
	Test 2.	Disconnect terminal lead and terminal 2 lead from hi-lo relay. Check for continuity through relay. Reading should be zero. Disconnect terminal 4 lead from relay and energize relay terminal 4 with 24 vdc. Check for continuity through terminals 1 and 2. Reading should be infinity. If readings other than above are obtained, replace hi-lo relay (para 3-18).
	Test 3.	Refer to malfunction 4, test 2, table 3-6.
	Test 4.	Refer to malfunction 1, test 18, table 3-6.
	Tests 5 and 6.	Refer to tests 4 and 5, malfunction 4, table 3-6.
5. Heater smokes excessively or bangs upon starting.	Test 1.	Test fuel control valve. Refer to malfunction 1, test 10, above.
	Test 2.	Test burner switch. Refer to malfunction 1, test 9, above.
	Test 3.	Test overheat switch. Refer to malfunction 1, test 11, above.
6. Blower does not stop when run-off-start switch is placed in OFF position.	Test 1.	Disconnect flame detector switch leads from receptacle pins D and E, and disconnect motor resistor lead from flame switch terminal. Loosen flame detector switch adjusting nut (para 3-14) until switch clicks. Check for continuity from motor switch terminal to each disconnected lead, and through

**Table 3-7. Personnel Heater 11601809 (19207) Electrical
System Troubleshooting—Continued**

Personnel heater system malfunction	Test
6. Continued	switch between leads. All readings should be zero. If any other reading is obtained, replace switch (para 3-14). If all readings are good, adjust switch (para 3-14). Refer to malfunction 6, tests 2 and 3, table 3-6.
7. Heater stops after running briefly in extreme cold weather.	Tests 2 and 3. Test 4. Test Test fuel control valve. Refer to malfunction 1, test 10, above. Test valve relay. Test is similar to test of hi-lo relay. Refer to malfunction 4, test 2, above. Replace valve relay if defective.

(4) Disconnect wiring harness (21) from heater assembly (9).

(5) Loosen clamp (6), and remove hose (5) from heater elbow (7).

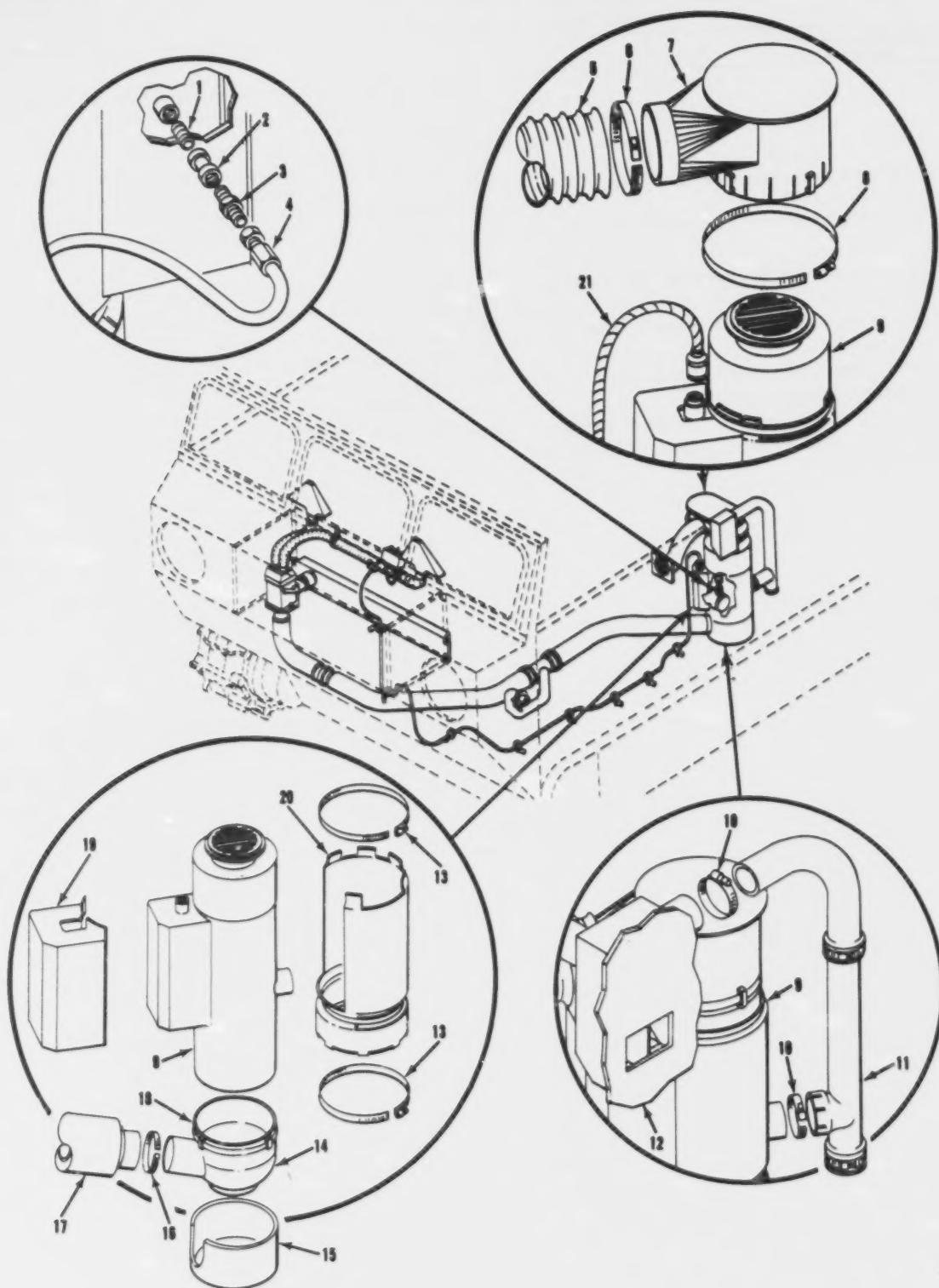
(6) Loosen clamp (16), and remove hose (17) from heater base assembly (14).

(7) Loosen two clamps (13), and remove heater cover (20) and control cover (19) from heater assembly (9).

(8) Remove heater assembly (9) from base assembly cover (15), and remove heater assembly from carrier.

(9) Loosen clamp (8), and remove elbow (7) and clamp from heater assembly (9).

(10) Loosen clamp (18), and remove base assembly (14) from heater assembly (9).



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Figure 3-6. Personnel heater.

LEGEND to fig. 3-6

- 1 Heater fuel inlet nipple
- 2 Heater fuel inlet coupling
- 3 Heater hose assembly nipple
- 4 Fuel pump-to-heater hose assembly
- 5 Heater elbow hose
- 6 Heater elbow hose clamp
- 7 Heater elbow
- 8 Heater elbow clamp
- 9 Heater assembly
- 10 Exhaust pipe hose clamp
- 11 Exhaust pipe
- 12 Air chamber
- 13 Heater clamp
- 14 Heater base assembly
- 15 Heater base assembly cover
- 16 Heater base assembly hose clamp
- 17 Heater base assembly hose
- 18 Heater base assembly clamp
- 19 Heater control cover
- 20 Heater cover
- 21 Wiring harness

b. Inspection and Repair.

(1) Check personnel heater and components as described in electrical troubleshooting (para 3-7). Replace heater or components if defective.

(2) Inspect heater assembly for cracks, dents, distortion, and burn-through. Remove dents and distortion. Repair cracks. Replace heater assembly that shows burn-through or is damaged beyond repair. If replacement heater assembly is to be installed, remove nipple (3), coupling (2), and nipple (1), and install in replacement heater assembly.

(3) Inspect heater assembly elbow, covers, and base assembly for dents and cracks. Remove dents, and repair cracks. Replace elbow, covers, and base assembly damaged beyond repair.

c. Installation.

(1) Position base assembly (14) on heater assembly (9), and tighten clamp (18).

(2) Position elbow (7) and clamp (8) to top of heater assembly (9), and tighten clamp.

(3) Install heater assembly (9) in carrier. Position heater assembly (9) so that tube extending

from base assembly (14) is in alignment with cutout in cover (15).

(4) Position heater cover (20) and control cover (19) on heater assembly (9), and tighten two clamps (13).

(5) Position hose (17) on base assembly (14), and tighten clamp (16).

(6) Position hose (5) on elbow (7), and tighten clamp (6).

(7) Connect wiring harness (21) to heater assembly (9).

(8) Connect fuel pump-to-heater hose assembly (4) to heater assembly (9).

(9) Position exhaust pipe (11) on heater assembly (9) and air chamber (12), and tighten two clamps (10).

(10) Connect battery negative lead (para 2-98).

(11) Start heater assembly (TM 9-1450-585-10), and check for fuel leaks.

d. Deleted.

DELETED

Figure 3-7. Rework of heater 7748716 (19207) (Stewart-Werner).

- 1 Right defroster hose clamp
- 2 Right defroster hose
- 3 Right defroster
- 4 Right defroster cap screw washer
- 5 Right defroster cap screw
- 6 Left defroster hose loop clamp nut
- 7 Left defroster hose loop clamp washer
- 8 Left defroster hose loop clamp
- 9 Left defroster hose loop clamp machine screw
- 10 Left defroster hose
- 11 Left defroster hose clamp
- 12 Left defroster
- 13 Left defroster cap screw washer
- 14 Left defroster cap screw
- 15 Left defroster nut
- 16 Duct assembly guard
- 17 Duct assembly cap screw
- 18 Duct assembly washer
- 19 Duct assembly
- 20 Duct assembly spacer
- 21 Duct assembly nut
- 22 Duct assembly hose clamp
- 23 Heater regulator adapter screw
- 24 Clamp
- 25 Regulator air inlet adapter
- 26 Regulator air inlet adapter washer
- 27 Regulator air inlet adapter screw
- 28 Air regulator housing
- 29 Defroster fans
- 30 Right defroster nut
- 31 Windshield frame
- 32 Duct assembly guard screw
- 33 Duct assembly hose
- 34 Heater regulator adapter washer
- 35 heater regulator adapter washer
- 36 Heater regulator adapter nut
- 37 Defroster fan attachment screw washer
- 38 Defroster fan attachment screw

Figure 3-10.1. Regulator, ducts, and defroster hoses (late models)
- exploded view - continued.

mounting hole on vehicle, and secure with screw (9), washer (7), and nut (6).

(1) Place two clamps (1) on right defroster hose (2). Attach one end of hose to right defroster (3) and the other end to housing (28). Position and tighten clamps (1).

(m) Connect defroster fan wiring harness (para 3-13.2) to defroster fan leads.

3-12. Control Box (fig. 3-11)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect control box circuit 400 lead (11) from main wiring harness circuit 400 lead (8).

(2) Disconnect wiring harness (7) from connector (18).

(3) Remove two screws (3) securing panel (2) in case (17), and pull panel from case.

(4) Remove circuit breaker nut (1), screw (6), and two ground lead lock washers (4) securing ground lead (5) to panel (2), and remove panel. Discard washers.

(5) Remove two screws (12), nuts (16), washers (15), and mounts (13) securing control box case (17) to bracket (14), and remove case.

b. *Inspection and Repair.* Check control box and components as described in electrical troubleshooting (para 3-7). Replace control box or components if defective.

c. Installation.

(1) If installing replacement control box, perform the following:

(a) Perform (3) in a above.

(b) Remove and discard two screws, nuts, and washers supplied in control box case mounting holes.

(c) Remove circuit breaker inner screw and nut.

(d) Install shell (10) on circuit 400 lead (11), and secure with washer (9).

(2) Position control box case (17) on bracket (14), and secure with two screws (12), mounts (13), washers (15), and nuts (16).

(3) Position ground lead (5) and two new lock washers (4) on control panel (2), and secure with circuit breaker screw (6) and nut (1).

(4) Position panel (2) in case (17), and secure with two screws (3).

(5) Connect wiring harness (7) to connector (18).

(6) Connect control box circuit 400 lead (11) to main wiring harness circuit 400 lead (8).

3-13. Heater Control Cover

a. *Removal (Heater 11668862 (19207)) (fig. 3-12).* Rotate two fasteners to left until cover is released, and remove cover from heater assembly.

b. *Removal (Heater 11601809 (19207)) (fig. 3-12).* Remove fasteners from control cover, and remove cover from heater assembly.

c. *Inspection and Repair.* Inspect cover for dents and deformation. Remove dents and deformation.

NOTE

Do not discard cover.

d. *Installation (Heater 11668862 (19207)) (fig. 3-12).* Position control cover on heater assembly, and rotate two fasteners to right to secure cover.

e. *Installation (Heater 11601809 (19207)) (fig. 3-12).* Position control cover on heater assembly, and secure with fasteners.

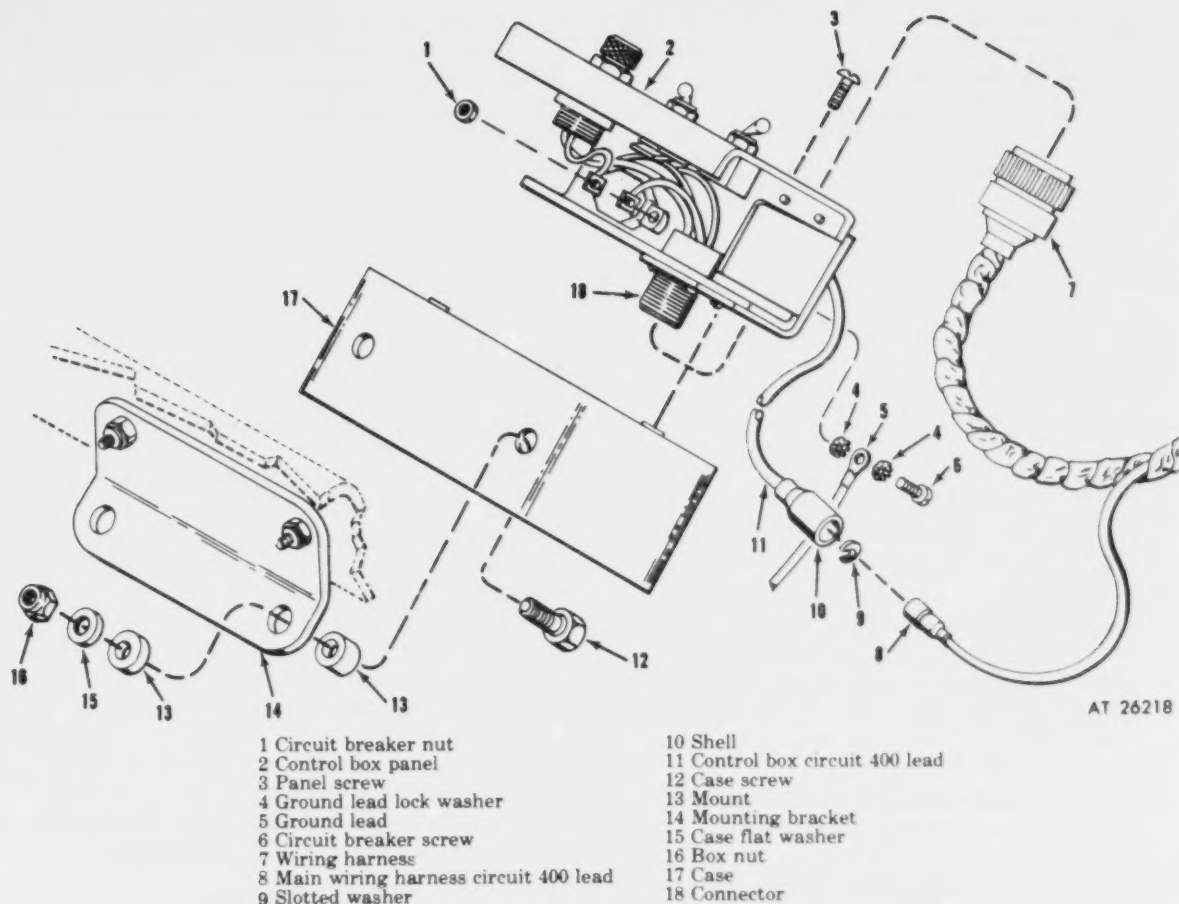


Figure 3-11. Control box.

3-13.01. Ignitor

a. Removal (Heater 11668862 (19207)) (fig. 3-13).

WARNING

Make sure battery ground lead is disconnected before you work on heater.

- (1) Remove control cover (1) from heater (para 3-13).
- (2) Disconnect heater wiring harness from heater.

(3) Release two fasteners that secure electrical inlet assembly (9) to heater housing. Pull inlet assembly up to disengage it from ignitor leads and fuel tube. Then swing it out of the way without disconnecting any leads or removing electrical cable from connector.

(4) Press, turn to left, and lift ignitor (10) from heater. Ignitor can be removed without disconnecting leads.

b. Removal (Heater 11601809 (19207)) (fig. 3-14).

WARNING

Make sure battery ground lead is disconnected before you work on heater.

- (1) Remove insulated control cover (19, fig. 3-6).
- (2) Remove control cover (para 3-13).
- (3) Pry up ignitor cover to expose ignitor.
- (4) Disconnect ignitor lead from ignitor terminal.

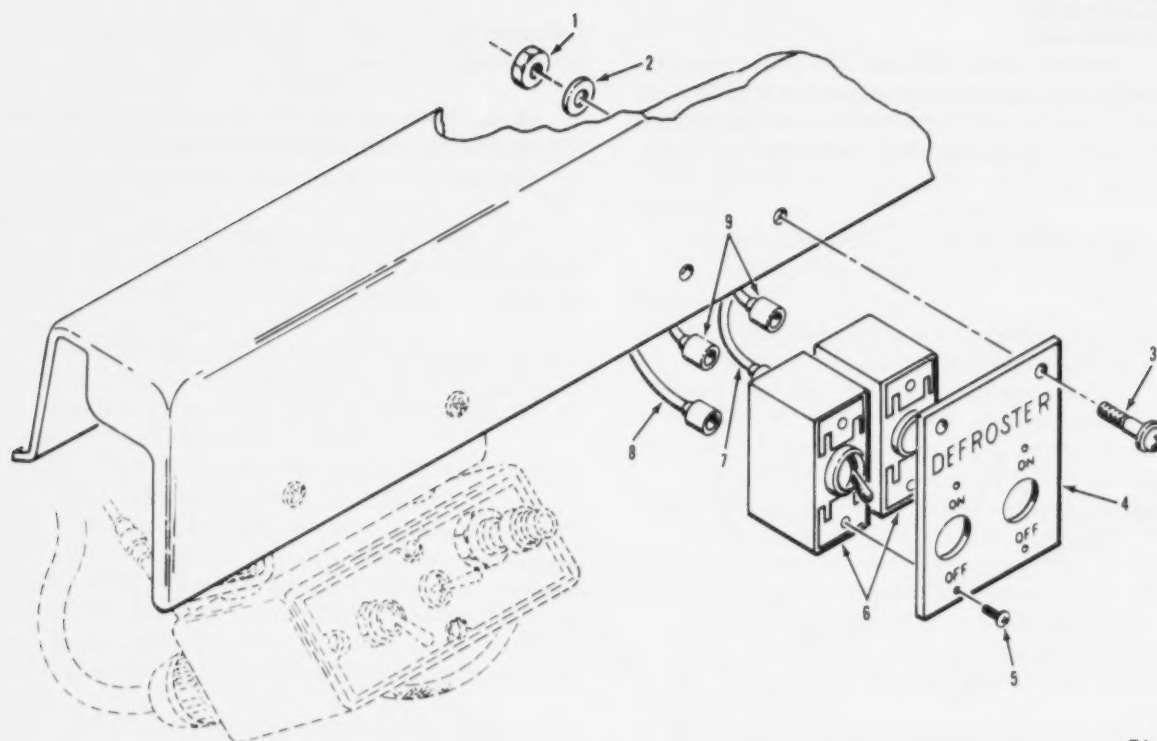
- (5) Using a deep socket, unscrew ignitor.
- (6) Remove ignitor and gasket. Discard gasket.

c. Inspection and Repair (Heater 11668862 (19207)) (fig. 3-11.3)

(1) Disconnect fuel shutoff solenoid lead 30 on overheat switch to keep from flooding burner.

(2) Connect the battery ground, and connect wiring harness to heater.

(3) With ignitor leads connected to ignition control and ground, hold control switch in START until ignitor glows.



1 Nut
2 Washer
3 Screw

4 Plate
5 Screw
6 Switch

7 Right fan lead — circuit 346
8 Left fan lead — circuit 347
9 Lead — circuit 38

Figure 3-11.1. Defroster fan control panel — exploded view.

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and 347 from switches (6) on control panel.

(3) Remove two nuts (1), washers (2), and screws (3) securing control panel plate (4) to vehicle. Remove plate and switches as an assembly.

(4) Remove four screws (5) securing two switches (6) to plate (4). Separate switches from plate.

b. Inspection and Repair.

(1) Check switches to be sure they are not defective. Replace defective switches.

(2) Check panel and attaching hardware for damage and burred threads. Remove burs. Replace any damaged parts.

c. Installation.

(1) Place switches (6) on plate (4). Secure with four screws (5).

(2) Position plate and switches on vehicle, and secure with two screws (3), washers (2), and nuts (1).

(3) Connect circuit 38 and 346 connectors to right defroster fan switch. Connect circuit 38 and 347 connectors to left defroster fan switch.

(4) Connect battery negative lead (para 2-98).

(5) Turn switches on, and check operation of defroster fans.

3-13.2. Defroster Fan Wiring Harness

(fig. 3-11.2)

NOTE

Make certain master switch is OFF.

a. Removal.

(1) Disconnect battery negative lead (para 2-98).

(2) Disconnect circuit 38 connector from vehicle wiring harness.

(3) Disconnect circuit 347 from left defroster fan. Disconnect circuit 346 from right defroster fan.

(4) Disconnect circuit 38 and 347 connectors from left defroster fan switch. Disconnect circuit 38 and 346 connectors from right defroster fan switch.

b. Inspection and Repair.

(1) Examine harness for frayed, broken, or cracked insulation. Check for damaged or missing connectors and terminals. Replace missing or damaged connectors and terminals. If wiring harness needs replacement, notify direct support maintenance personnel.

(2) Repair of the defroster fan wiring harness is limited to replacing connectors and terminals. See figure 2-63 and 2-93 for instructions on harness repair.

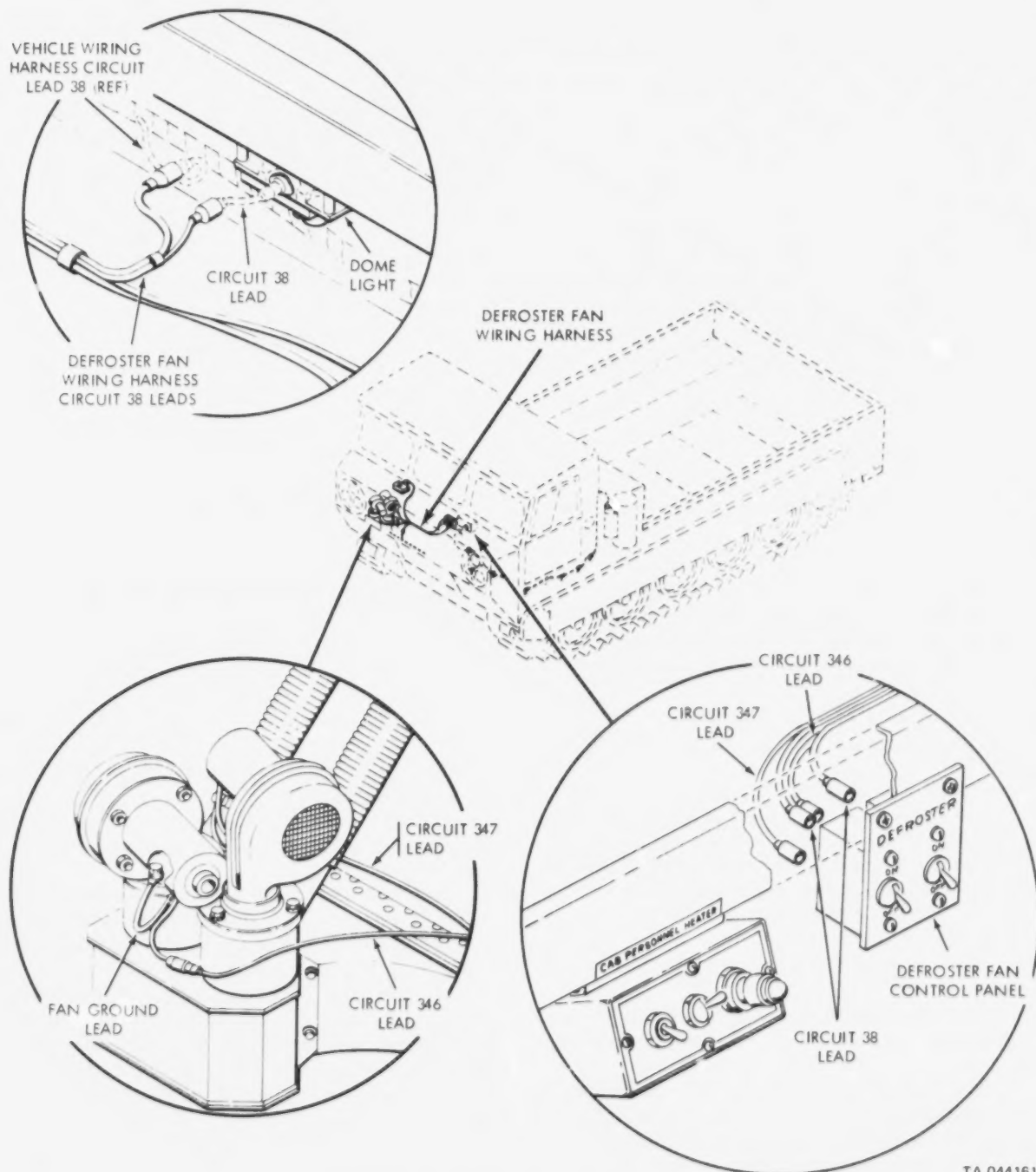
c. Installation.

(1) Connect circuit 38 and 346 connectors to right defroster fan switch. Connect circuit 38 and 347 connectors to left defroster fan connector.

(2) Connect circuit 346 connector to right

defroster fan connector. Connect 347 connector to left defroster fan connector.

(3) Connect circuit 38 connector to vehicle wiring harness circuit 38 connector.



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Figure 3-11.2. Defroster fan wiring harness.

CAUTION

When ignitor has been removed from heater, it must be tested at 10 volts or less. Voltage greater than 10 volts will damage ignitor.

(4) Compare glowing ignitor with figure 3-11.3 to determine condition of ignitor. An ignitor that looks like A, figure 3-11.3 is in good condition and can be used without repair.

(5) An ignitor which has hot spots, uneven coil spacing, hot and cool coils like B, fig. 3-11.3, should be replaced. If you have to, repair the ignitor as described in (6) below.

(6) When ignitor has hot spots like those shown in C or D, fig. 3-11.3, repair as follows:

(a) Use a 1/8 inch diameter glass or ceramic rod with ball end to roll over glowing element of ignitor. The rod must be rolled and not dragged across the element. A scraping of scuffing motion will cause new shorts and hot spots. A spare or broken ceramic rod from flame detector switch can be used.

(b) When brightness of hot spot gets dimmer, blow gently on element and keep on rolling rod back and forth. This helps the formation of an oxide coating on the surface of the element, which insulates adjacent turns from each other.

(c) When the element heats uniformly, turn control switch to OFF and disconnect battery ground lead, and heater wiring harness. Connect lead 30 to overheat switch.

(7) Inspect ignition wick by looking into ignitor tube. Wick should be dry, unbroken, and white or nearly white. Strands should be about 1/16 inch thick.

(8) When inspection shows strands are thin or broken, replace heater.

(9) When inspection shows wick is wet, burner is flooded and you will have to install ignitor (e below) and do the following:

(a) Disconnect shutoff solenoid lead at terminal 30 on overheat switch.

(b) Hold control switch in START position. A white smoke-like fuel vapor will flow from the exhaust until the heater lights. When heater lights, turn control switch to OFF and connect shutoff solenoid lead to terminal 30 on overheat switch.

d. Inspection and Repair (Heater 11601809 (19207)).

Check ignitor as described in electrical troubleshooting (para 3-7). Replace ignitor if defective.

e. Installation (Heater 11668862 (19207)) (fig. 3-13).

(1) Make sure seal (14) is seated in heater housing (13).

(2) When a new ignitor is installed, connect short lead to ground terminal on heater housing (13). Connect long lead to ignition control (3).

(3) Install ignitor (10) in ignitor tube, making sure element end of the ignitor is firmly seated.

(4) Push down on ignitor and turn to right to engage pin on ignitor with slots in ignitor tube.

(5) Position electrical inlet assembly (9) on heater housing (13), and secure with two fasteners.

(6) Connect heater wiring harness to heater.

(7) Install control cover (para 3-13).

(7.1) Connect battery negative lead (para 2-98).

(8) Start heater (TM 9-1450-585-10), and check operation of ignitor.

f. Installation (Heater 11601809 (19207)) (fig. 3-14).

(1) Install new gasket and ignitor in heater.

(2) Using a deep socket, tighten ignitor.

(3) Connect ignitor lead to ignitor terminal.

(4) Install ignitor cover.

(4.1) Connect battery negative lead (para 2-98).

(5) Start heater assembly (TM 9-1450-585-10), and check operation of ignitor.

(6) Install control cover (para 3-13).

(7) Install insulated control cover (19, fig. 3-6).

3-13.1. Defroster Fan Control Panel
(fig. 3-11.1)

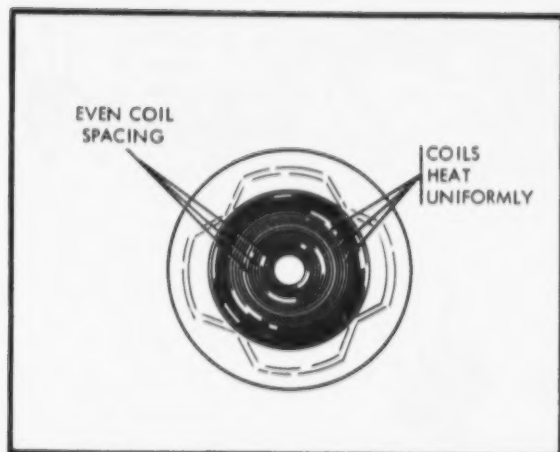
NOTE

Make sure master switch is OFF.

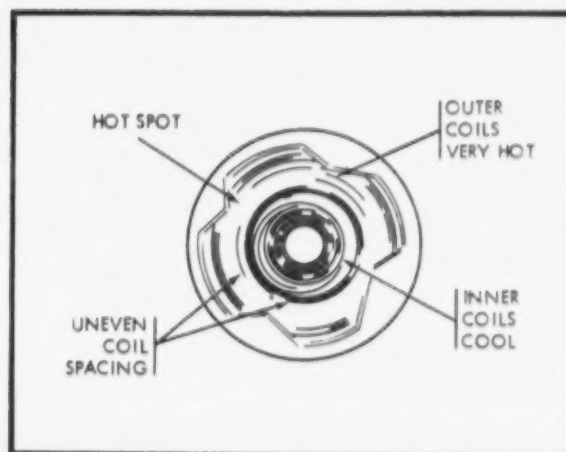
a. Removal

(1) Disconnect battery negative lead (para 2-98).

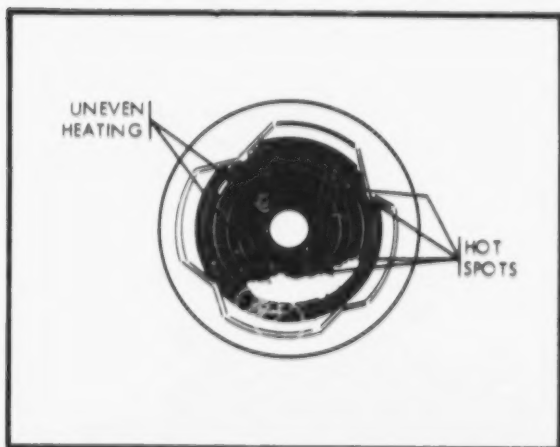
(2) Disconnect connectors for circuits 38, 346,



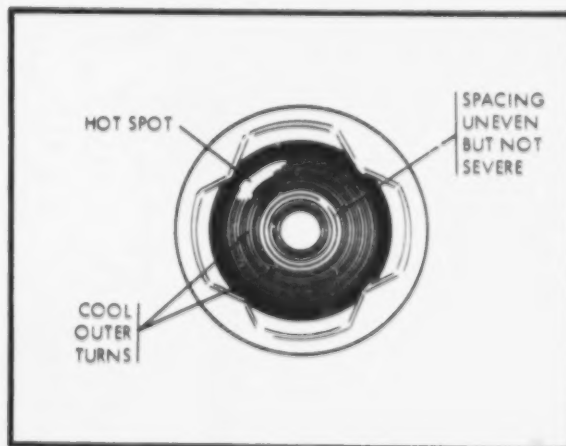
A. Good igniter.



B. Defective igniter -- repair is possible, but replacement is recommended.



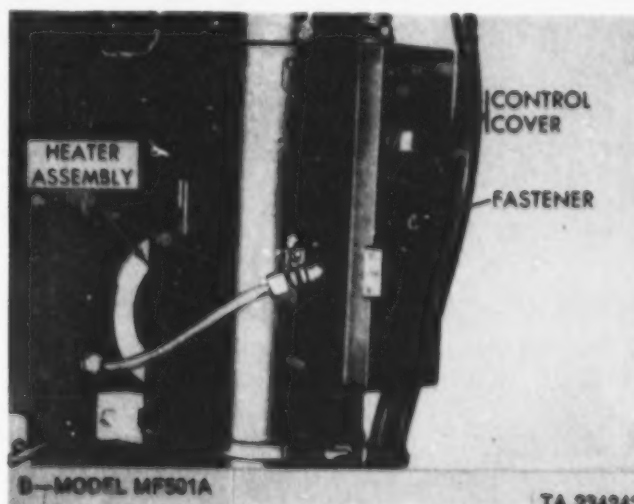
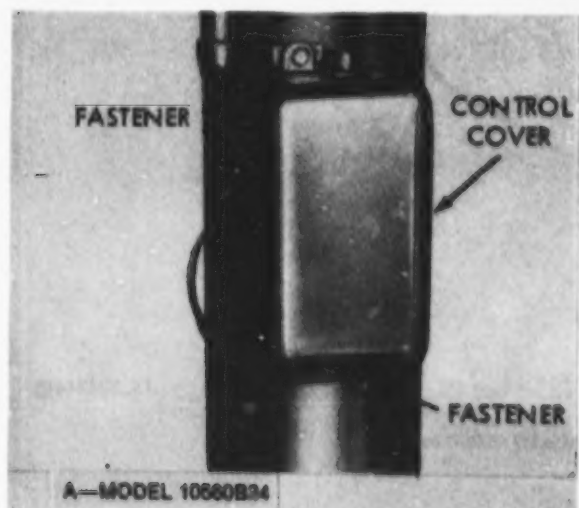
C. New igniter with hot spots -- repair.



D. Used igniter with hot spots -- repair.

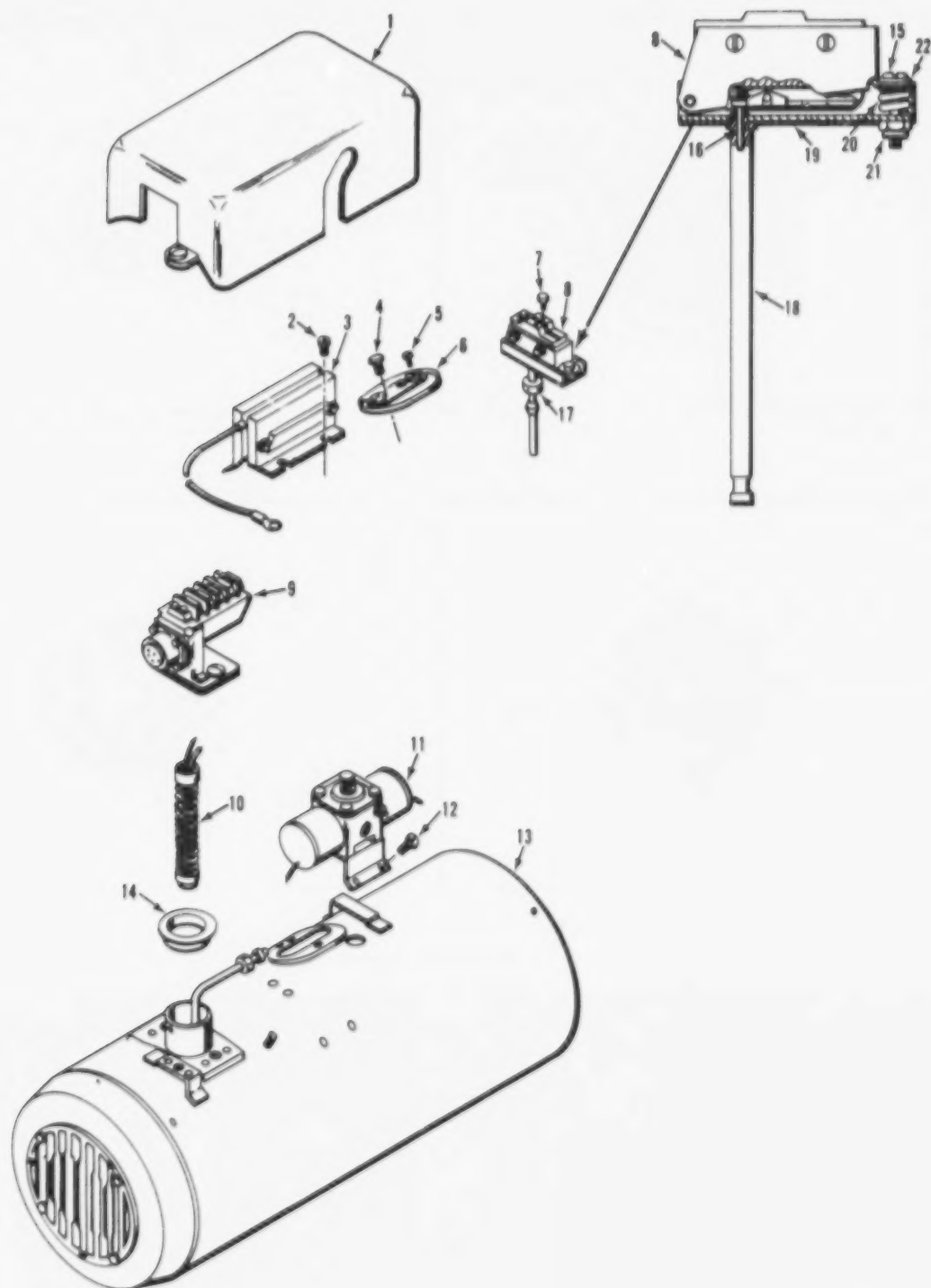
Figure 3-11.3. Ignitor element.

TA 044264 ■



TA 234243 ■

Figure 3-12. Heater control cover.



TA 234244

Figure 3-13. Heater assembly 11668863 (19207) controls.

Legend to fig. 3-13.

- | | |
|-----------------------------|--------------------|
| 1 Cover | 12 Screw |
| 2 Screw | 13 Heater housing |
| 3 Ignition control | 14 Seal |
| 4 Screw | 15 Adjusting screw |
| 5 Screw | 16 Ceramic rod |
| 6 Overheat switch | 17 Compression nut |
| 7 Screw | 18 Tube |
| 8 Flame detector switch | 19 Bracket |
| 9 Electrical inlet assembly | 20 Spring |
| 10 Ignitor | 21 Nut |
| 11 Fuel control valve | 22 Washer |



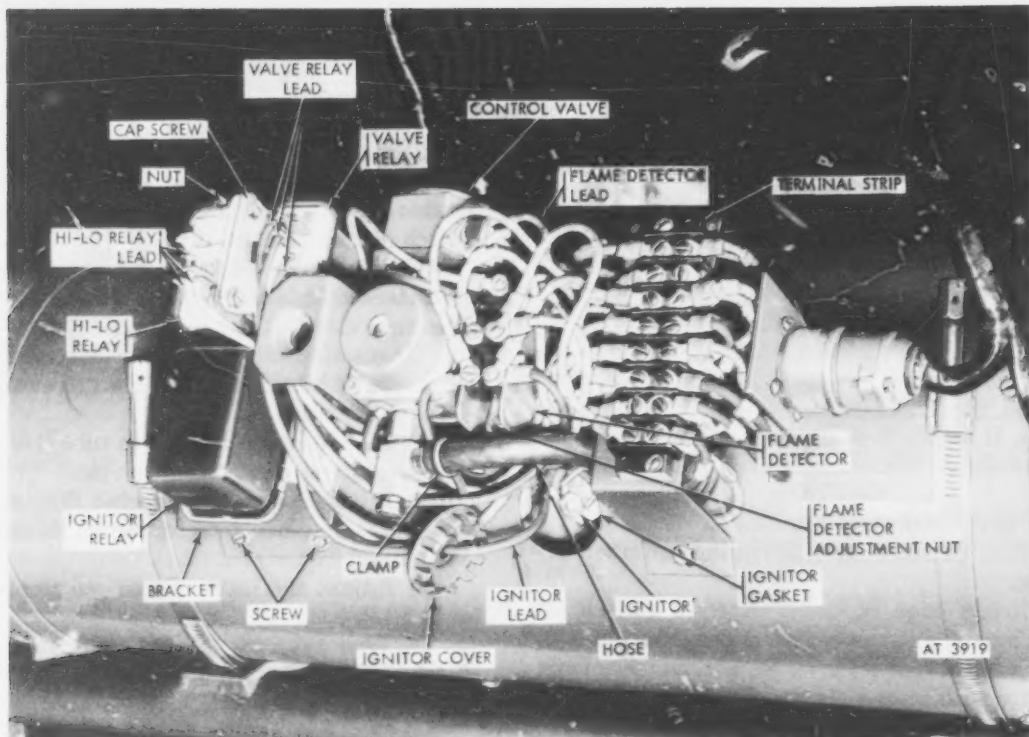


Figure 3-14. Heater 11601809 (19207) controls.

3-14. Flame Detector Switch

NOTE

Switch is adjusted at time of assembly for proper purge and starting times; readjust only when insulating cement is broken and adjusting screw has rotated.

a. Adjustment (Heater 11668862 (19207)) (fig. 3-13).

NOTE

When flame detector switch is assembled and properly adjusted, ceramic rod depresses actuator to close NO contacts.

(1) Inset ceramic rod (16) into tube. Pivot microswitch back on bracket and install adjusting screw (15).

(2) Slowly turn in adjusting screw (15) until switch just clicks, then exactly 1/2 turn more. Secure adjustment by sealing the adjusting screw (15) with a small quantity of insulating cement 5970-00-161-7421.

b. Adjustment (Heater 11601809 (19207)) (fig. 3-14).

NOTE

Make certain master switch is OFF.

(1) Remove insulated control cover (19, fig. 3-6).

(2) Remove control cover (para 3-13).

(3) Turn adjusting nut counterclockwise until a distinct click is heard.

(4) Turn adjusting nut clockwise until a second click is heard. After the second click is heard, turn adjusting nut 3/4 of a turn more.

(5) Start heater assembly (TM 9-1450-585-10), and check operation of flame detector switch. If starting time is more than 3 minutes or purge time is more than 4 minutes, replace switch (d and g below).

c. Removal (Heater 11668862 (19207)) (fig. 3-13).

WARNING

Make sure battery ground lead is disconnected before you work on heater.

(1) Remove control cover (para 3-13).

(2) Make sure the four leads to flame detector switch-terminals NC and NO are identified. Remove four screws (7), and disconnect four leads.

(3) Loosen compression nut (17) securing flame detector switch (8) to heater assembly, and lift switch tube straight out of bushing in heater assembly.

d. Removal (Heater 11601809 (19207)) (fig. 3-14).

WARNING

Make sure battery ground lead is disconnected before you work on heater.

- (1) Perform steps (1) and (2) in c above.
- (2) Remove eight leads from flame detector switch.

(3) Loosen compression nut securing flame detector switch to heater assembly, and lift switch straight out of heater assembly.

e. Inspection and Repair.

(1) With switch assembly inverted, rap on the side of tube to jar loose oxides and dirt. Continue rapping until no more oxides fall out of tube.

(2) Pivot microswitch back on bracket. Check for continuity. There must be continuity across the NC contacts until actuator on bottom of switch is depressed, then there must be continuity across NO contacts. If switch is defective, replace switch.

f. Installation (Heater 11668862 (19207) (fig. 3-13).

CAUTION

To prevent damage to flame detector switch, do not bend tube during installation.

(1) Insert tube of flame detector switch (8) straight into bushing on heater, and tighten nut (17).

(2) Connect four leads to NC and NO terminals and secure with screws (7). See figure for personnel heater schematic diagram.

(3) Connect battery ground lead.

(4) Start heater (TM 9-1450-585-10) and check operation of flame detector switch.

(5) Install control cover (para 3-13).

g. Installation (Heater 11601809 (19207)) (fig. 3-14).

NOTE

To prevent damage to flame detector switch, do not bend tube.

(1) Insert tube of flame detector switch straight into bushing on heater assembly.

(2) Position flame detector switch, with adjusting nut end toward ignitor opening, in heater assembly.

(3) Connect electrical leads to flame detector switch terminals (para 3-7).

(3.1) Connect battery negative lead (para 2-98).

(4) Start heater assembly (TM 9-1450-585-10) and check operation of flame detector switch.

(5) Install control cover (para 3-13).

(6) Install insulated control cover (19, fig 3-6).

3-14.1. Ceramic Rod (Heater 11668862 (19207)) (fig. 3-13).

a. Removal.

(1) Remove flame detector switch (para 3-14).

(2) Remove adjusting screw (15), nut (21), washer (22), and spring (20) from flame detector switch (8) and bracket.

(3) Lift the top of flame detector switch (8) and turn the switch over. Remove the ceramic rod (16) from tube (18).

b. Inspection and Repair. Check ceramic rod (16) for cracks or breaks. Replace defective rod.

c. Installation.

(1) Place ceramic rod (16) in tube (18) and close the top of flame detector switch (8).

(2) Install spring (20), washer (22), screw (15), and nut (21) in flame detector switch (8) and bracket (19).

(3) Adjust and install flame detector switch (8) (para 3-14).

3-15. Fuel Control Valve

a. Deleted.

b. Removal (Heater 11601809 (19207)) (fig. 3-14).

WARNING

Make sure that battery ground lead is disconnected before working on heater.

(1) Disconnect battery negative lead (para 2-98).

(2) Remove insulated control cover (19, fig 3-6).

(3) Remove control cover (para 3-13).

(4) Disconnect four fuel control valve electrical leads from terminal strip.

(5) Remove fuel hose assembly and fittings (para 3-10).

(6) Remove clamp from fuel hose.

(7) Remove fuel hose from control valve.

(8) Remove two cap screws from fuel control valve bracket, and remove fuel control valve and bracket from heater assembly.

c. Inspection and Repair.

(1) Check fuel control valve as described in electrical troubleshooting (para 3-7). Replace valve if defective.

(2) Inspect fuel control valve for dents, damaged threads, and frayed electrical leads. Replace valve that shows any of these defects.

d. Deleted.

e. Installation (Heater 11601809 (19207)) (fig. 3-14).

- (1) Position fuel control valve and bracket on heater assembly, and secure with two cap screws.
- (2) Position hose on fuel control valve.
- (3) Secure hose to fuel control valve with clamp.
- (4) Install fuel hose assembly and fittings in fuel control valve (para 3-10).
- (5) Connect four fuel control valve leads to terminal strip (fig. 3-3).
- (6) Connect battery negative lead (para 2-98).
- (7) Start heater assembly (TM 9-1450-585-10), and check operation of fuel control valve.
- (8) Install control cover (para 3-13).
- (9) Install insulated control cover (19, fig. 3-6).

3-16. Overheat Switch

- a. Deleted.
- b. Removal (Heater 11601809 (19207)) (fig. 3-15).

NOTE

Make sure that battery negative lead is disconnected before working on heater.

- (1) Disconnect battery lead (para 2-98).
- (1.1) Remove insulated control cover (19, fig. 3-6).
- (1.2) Remove control cover (para 3-13).
- (2) Remove screw, nut, and lead from ignitor relay.
- (3) Disconnect valve relay circuit 1 and 4 leads from flame detector switch.
- (4) Disconnect valve relay circuit 2 lead from terminal strip.
- (5) Disconnect hi-lo relay circuit 1, 2, and 4 leads from terminal strip.
- (6) Remove four screws from relay bracket, and remove hi-lo relay, valve relay, ignitor relay, and bracket from heater assembly.

- (7) Disconnect overheat switch circuit 1 and 7 leads from terminal strip.

- (8) Remove two screws from cover, and remove cover and overheat switch from heater assembly.

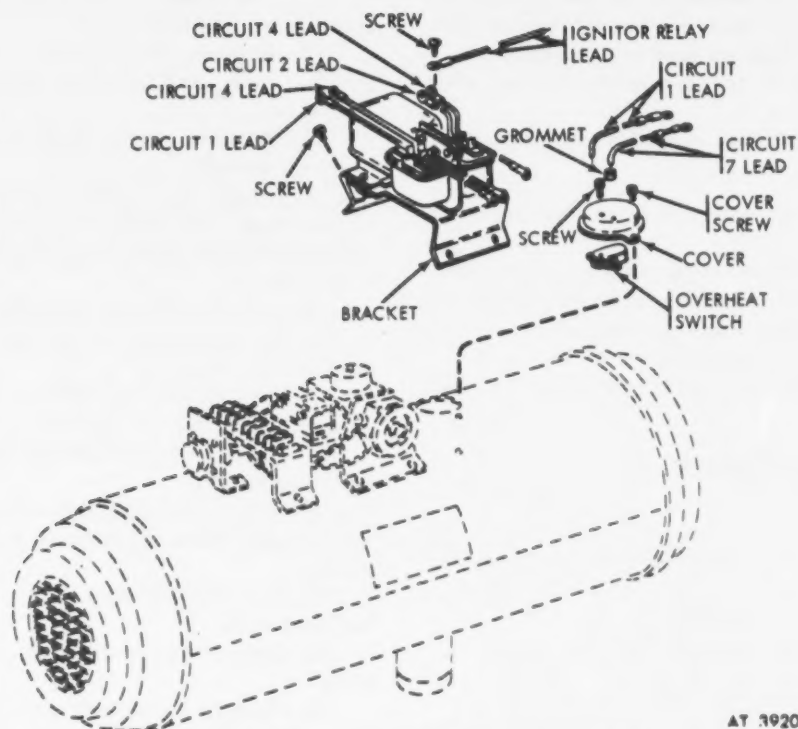
- (9) Remove screw from cover, and remove overheat switch.

c. *Inspection and Repair.* Check over heat switch as described in electrical troubleshooting (para 3-7). Replace overheat switch if defective.

d. Deleted.

e. *Installation (Heater 11601809 (19207)) (fig. 3-15).*

- (1) Secure overheat switch to cover with machine screw.
- (2) Position overheat switch and cover in heater assembly, and secure with two screws.
- (3) Connect overheat switch circuit 1 and 7 leads to terminal strip.
- (4) Position bracket, hi-lo relay, valve relay, and ignitor relay on heater assembly, and secure with four screws.
- (5) Connect hi-lo relay circuit 1, 2, and 4 leads to terminal strip.
- (6) Connect valve relay circuit 2 lead to terminal strip.
- (7) Connect valve relay circuit 1 and 4 leads to flame detector switch.
- (8) Secure ignitor relay lead to ignitor with screw and nut.
- (9) Connect battery negative lead (para 2-98).
- (10) Start heater assembly (TM 9-1450-585-10), and check operation of overheat switch.
- (11) Install control cover (para 3-13).
- (12) Install insulated control cover (19, fig. 3-6).



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Figure 3-15. Heater 11601809 (19207) overheated switch.

3-17. Ignition Control (Heater 11668862 (19207)) (fig. 3-13).

a. Removal

WARNING

Make sure battery ground lead is disconnected before you work on heater.

NOTE

See figure for personnel heater schematic diagram when disconnecting or connecting leads.

- (1) Remove control cover (1) (para 3-12).
- (2) Disconnect ignitor and voltage limiter leads from ignition control (3).
- (3) Disconnect ignition control lead from one of the NO contacts on flame detector switch (8).
- (4) Remove four screws (2) securing ignition control (3) to heater housing.

b. *Inspection and Repair.* Replace ignition control if defective.

c. Installation (Heater 11668862 (19207)) (fig. 3-13).

- (1) Install ignition control (3) on heater housing, and secure with four screws (2).
- (2) Connect ignitor and voltage meter leads to one end of ignition control (3).

(3) Connect ignition control lead to flame detector switch (8).

(4) Install control cover (para 3-13).

(5) Connect battery ground lead.

(6) Start heater (TM 9-1450-585-10), and check operation of ignition control.

3-18. Valve Relay (Heater 11601809 (19207)) (fig. 3-14).

a. Removal

NOTE

Disconnect battery negative lead.

- (1) Remove insulated control cover (19, fig. 3-6).
- (2) Remove control cover (para 3-13).
- (3) Disconnect valve relay circuit 1 and 4 leads from flame detector switch.
- (4) Disconnect valve relay circuit 2 lead from terminal strip.
- (5) Remove two screws and nuts securing valve relay and hi-lo relay to bracket, and remove valve relay.

b. Inspection and Repair. Check valve relay as described in electrical troubleshooting (para 3-7). Replace valve relay if defective.

c. Installation.

- (1) Position valve relay and hi-lo relay to bracket, and secure with two screws and nuts.
- (2) Connect valve relay circuit 2 lead to terminal strip.
- (3) Connect valve relay circuit 1 and 4 leads to flame detector switch.
- (4) Start heater assembly (TM 9-1450-585-10), and check operation of valve relay.
- (5) Install control cover (para 3-13).
- (6) Install insulated control cover (19, fig. 3-6).

3-19. Hi-Lo Relay (Heater 11601809 (19207))
(fig. 3-14).

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Remove insulated control cover (19, fig. 3-6).
- (2) Remove control cover (para 3-13).
- (3) Disconnect three valve relay circuits 1, 2 and 4 leads from terminal strip.
- (4) Remove two screws and nuts securing hi-lo relay and valve relay to bracket, and remove hi-lo relay.

b. Inspection and Repair. Check valve relay as described in electrical troubleshooting (para 3-7). Replace hi-lo relay if defective.

c. Installation.

- (1) Position hi-lo relay and valve relay to bracket, and secure with two screws and nuts.
- (2) Connect hi-lo relay circuit 1, 2 and 4 leads to terminal strip.
- (3) Start heater assembly (TM 9-1450-585-10), and check operation of hi-lo relay.
- (4) Install control cover (para 3-13).
- (5) Install insulated control cover (19, fig. 3-6).

3-20. Ignitor Relay (Heater 11601809 (19207))
(fig. 3-15)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Remove insulated control cover (19, fig. 3-6).
- (2) Remove control cover (para 3-13).
- (3) Remove two screws and nuts and ignitor relay circuit 6 lead from bracket.

- (4) Remove ignitor relay from bracket.

b. Inspection and Repair. Check ignitor relay as described in electrical troubleshooting (para 3-7). Replace ignitor relay if defective.

c. Installation.

- (1) Position ignitor relay on bracket.
- (2) Position ignitor relay circuit 6 lead to ignitor relay, and secure lead and ignitor relay to bracket with two screws and nuts.
- (3) Start heater assembly (TM 9-1450-585-10), and check operation of ignitor relay.
- (4) Install control cover (para 3-13).
- (5) Install insulated control cover (19, fig. 3-6).

3-21. Run-Off-Start Switch
(fig. 3-16)

a. Removal.

NOTE

Make certain master switch is OFF.

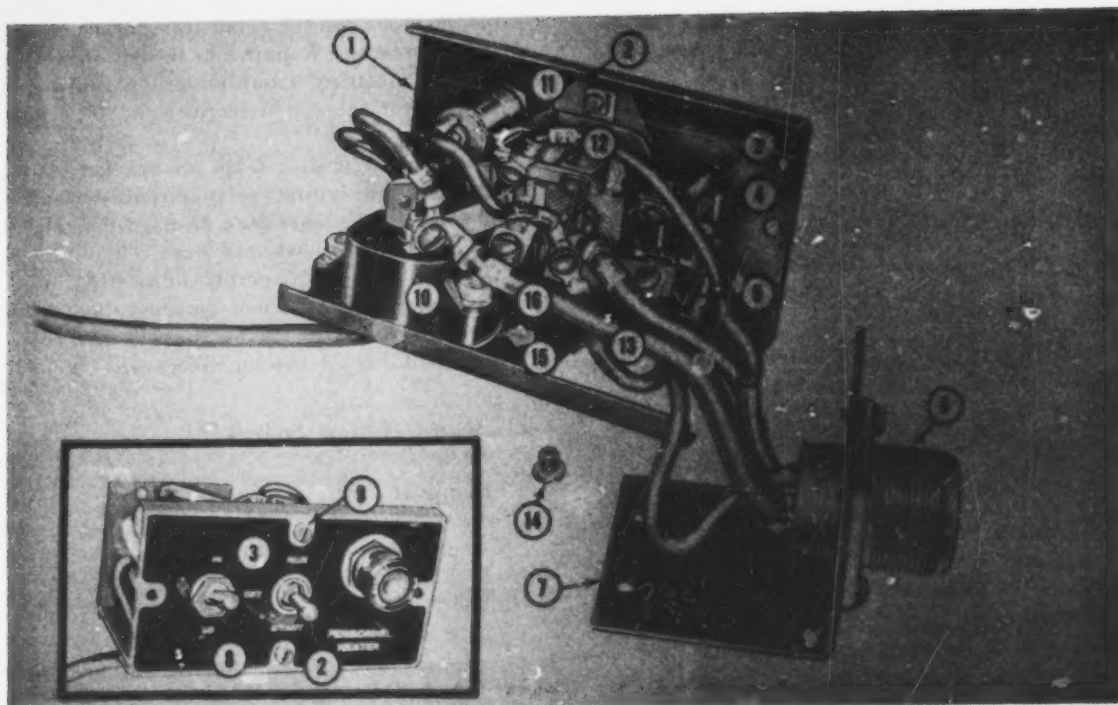
- (1) Remove personnel heater control box (para 3-12).
- (2) Remove two screws (14) securing control box receptacle (6) and bracket (7) to control box panel (1), and straighten leads from receptacle to control box components.
- (3) Disconnect circuit 14 lead (11), circuit 14-21 jumper (12), circuit 15-17 jumper (10), circuit 20 lead (13), circuit 19 lead (15), circuit 19 jumper-to-light lead (16), circuit 13-19 jumper (5), and circuit 14-18 jumper.

- (4) Remove two screws (9) securing switch (2) to panel (1), and remove switch.

b. Inspection and Repair. Check run-off-start switch as described in electrical troubleshooting (para 3-7). Replace switch if defective.

c. Installation.

- (1) Position run-off-start switch (2) on control box panel (1), and secure with two screws (9).
- (2) Connect circuit 14 lead (11), circuit 14-21 jumper (12), circuit 15-17 jumper (10), circuit 20 lead (13), circuit 19 lead (15), circuit 19 jumper-to-light lead (16), circuit 13-19 jumper (5), and circuit 14-18 jumper to run-off-start switch (2).
- (3) Position receptacle (6) and bracket (7) on control box panel (1), and secure with two screws (14).
- (4) Install personnel heater control box (para 3-12).



- 1 Control box panel
- 2 Run-off-start switch
- 3 Hi-lo switch
- 4 Circuit 12 lead
- 5 Circuit 13-19 jumper
- 6 Control box receptacle
- 7 Receptacle bracket
- 8 Nut and lock washer

- 9 Mounting screw
- 10 Circuit 15-17 jumper
- 11 Circuit 14 lead
- 12 Circuit 14-21 jumper
- 13 Circuit 20 lead
- 14 Receptacle bracket screw
- 15 Circuit 19 lead
- 16 Circuit 19 jumper-to-light lead

Figure 3-16. Control box run-off-start and hi-lo switches.

3-22. Hi-Lo Switch

(fig. 3-18).

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove personnel heater control box (para 3-12).

(2) Remove two screws (14) securing control box receptacle (6) and bracket (7) to control box panel (1), and straighten leads from receptacle to control box components.

(3) Disconnect circuit 12 lead (4) and circuit 13-19 jumper (5) from hi-lo switch (3).

(4) Remove nut and lock washer (8) securing hi-lo switch (3) to control box panel (1), and remove switch from panel.

b. *Inspection and Repair.* Check hi-lo switch as described in electrical troubleshooting (para 3-7). Replace switch if defective.

c. Installation.

(1) Position hi-lo switch (3) on control box panel (1), and secure with lock washer and nut (8).

(2) Connect circuit 12 lead (4) and circuit 13-19 jumper (5) to hi-lo switch (3). Refer to table 3-4 for terminal numbers and connections.

(3) Install receptacle (6) and bracket (7) on control box panel (1), and secure with two screws (14).

(4) Install personnel heater control box (para 3-12).

3-23. Indicator Light Lamp

(fig. 3-17)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Turn indicator light cover (5) counterclockwise to disengage threads, and remove cover from indicator light (12).

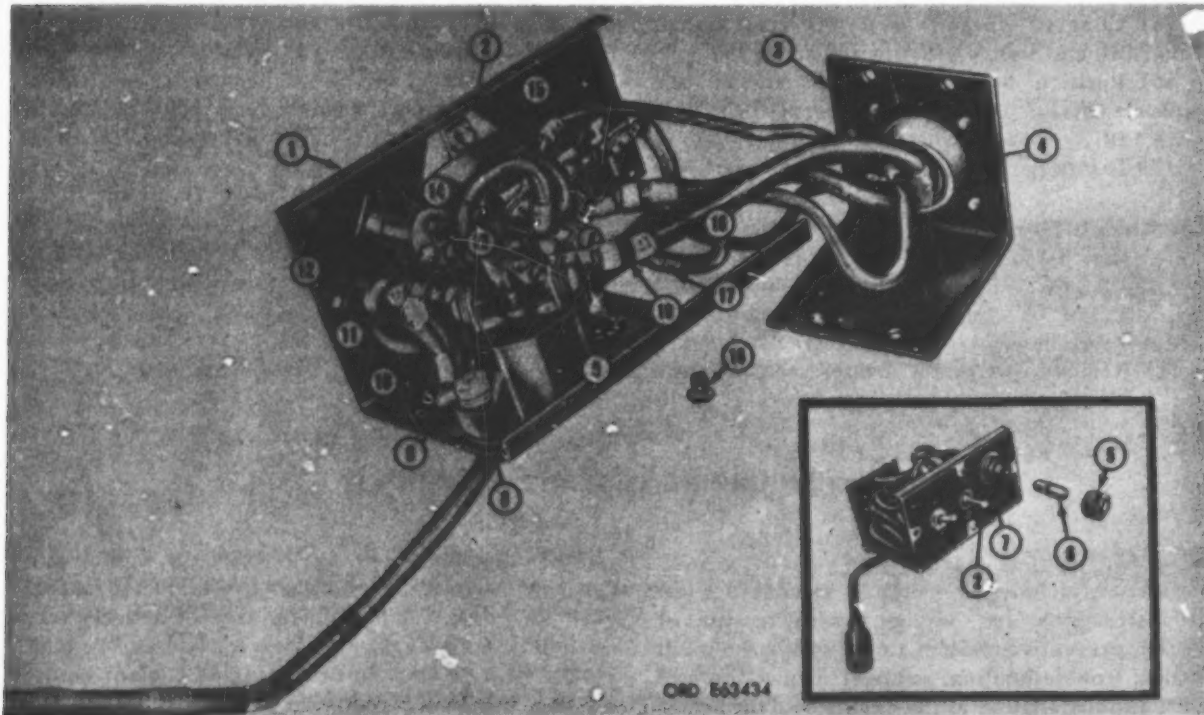
(2) Press lamp (6) in, rotate counterclockwise to disengage pins, and remove lamp from light (12).

b. Inspection and Repair. Check indicator light lamp as described in electrical troubleshooting (para 3-7). Replace lamp if defective.

c. Installation.

(1) Insert indicator light lamp (6) in indicator light (12), press lamp in, and rotate counterclockwise to engage pins.

(2) Position indicator light cover (5) on indicator light (12), and turn cover clockwise to secure.



- 1 Control box panel
- 2 Run-off-start switch
- 3 Receptacle bracket
- 4 Control box receptacle
- 5 Indicator light cover
- 6 Indicator light lamp

- 7 Nut and lock washer
- 8 Circuit breaker
- 9 Nut and screw
- 10 Ground lead
- 11 Circuit 16 lead
- 12 Indicator light
- 13 Circuit 15-17 jumper

- 14 Circuit 17 lead
- 15 Circuit 19 jumper-to-light lead
- 16 Circuit 13-19 jumper
- 17 Circuit 19 lead
- 18 Bracket screw
- 19 Circuit 17 receptacle lead

Figure 3-17. Control box indicator light and circuit breaker.

3-24. Indicator light (fig. 3-17)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove personnel heater control box (para 3-12).

(2) Remove two screws (18) securing control box receptacle (4) and bracket (3) to control box panel (1), and straighten leads from receptacle to panel components.

(3) Remove nut and screw (9) securing ground lead (10) and circuit breaker (8) to panel

(1), and disconnect lead from circuit breaker.

(4) Disconnect circuit 17 lead (14) from circuit breaker (8).

(5) Disconnect circuit 19 jumper-to-light lead (15) from run-off-start switch (2).

(6) Remove indicator light lamp (para 3-23).

(7) Remove nut and lock washer (7) securing indicator light (12) to panel (1), and remove light with leads.

b. Inspection and Repair. Check indicator light as described in electrical troubleshooting (para 3-7). Replace light if defective.

c. Installation.

(1) Position indicator light (12) on control box panel (1), and secure with lock washer and nut (7).

(2) Install indicator light lamp (para 3-23).

(3) Connect circuit 19 jumper-to-light lead (15) to run-off-start switch (2).

(4) Connect circuit 17 lead (14) to circuit breaker (8).

(5) Connect ground lead (10) to circuit breaker (8), and secure with nut and screw (9).

(6) Position bracket (3) and control box receptacle (4) on panel (1), and secure with two screws (18).

(7) Install personnel heater control box (para 3-12).

3-25. Circuit Breaker

(fig. 3-17)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove personnel heater control box (para 3-12).

(2) Disconnect circuit 16 lead (11), circuit 15-17 jumper (13), circuit 17 lead (14), and circuit 17 receptacle lead (19) from circuit breaker (8).

(3) Remove two nuts and screws (9) securing circuit breaker (8) and ground lead (10) to control box panel (1), and remove circuit breaker.

b. *Inspection and Repair.* Check circuit breaker as described in electrical troubleshooting (para 3-7). Replace circuit breaker if defective.

c. Installation.

(1) Position circuit breaker (8) on control box panel (1), connect ground lead (10) to circuit breaker, and secure circuit breaker and lead with two nuts and screws (9).

(2) Connect circuit 16 lead (11), circuit 15-17 jumper (13), circuit 17 lead (14), and circuit 17 receptacle lead (19) to circuit breaker (8).

(3) Install personnel heater control box (para 3-12).

Section II. ENGINE COOLANT HEATER KIT

3-26. General

This section includes description, tabulated data, and instructions for service upon receipt of materiel, preventive-maintenance, troubleshooting, electrical troubleshooting, removal, inspection and repair, and installation of the engine coolant heater kit described in paragraph 3-27.

3-27. Description

a. *General.* The engine coolant heater kit (fig. 3-18) provides for starting the carrier during extreme cold weather operation between -25° and -65° F. The engine coolant heater kit heats and circulates the engine coolant through the engine and a battery box heat exchanger to warm the engine block, lubricating oil, and battery electrolyte when the engine is not in operation. The engine coolant heater kit is not intended as a quick preheat system.

b. *Coolant heater.* The coolant heater, mounted on a bracket near the carrier air separator tank at the left of the power plant compartment, produces heat by burning a mixture of fuel and air in all-welded, stainless steel heat exchanger. A blower, mounted on the bottom of the heater, supplies air for combustion through a connecting tube to the burner air inlet in the heat exchanger. Mounted on the side of the heater are a terminal strip, for connecting electrical components of the heater; a

flame detector switch, to shut off the ignitor and preheat resistor when burning is established; a fuel control valve, to maintain the correct delivery rate and pressure of fuel to the burner; and an overheat thermostat, to shut down the engine coolant heater if it overheats. Mounted on the bottom of the heater, between the blower and the heat exchanger, are a restriction thermostat, to control heater output according to coolant temperature; and a blower resistor, to reduce blower speed during low heat operation. Mounted on top of the heater are a preheat resistor assembly, to preheat fuel during the starting cycle; and an ignitor, to ignite fuel during the starting cycle. A bracket-mounted receptacle connects the engine coolant heater to the coolant heater wiring harness, and the coolant heater wiring harness carries power and control circuits from the heater control box to the heater.

c. *Fuel System.* The heater fuel pump draws fuel for the coolant heater from the carrier air separator tank and pumps the fuel through an outlet hose to the heater fuel control valve. The heater fuel pump is located on the heater mounting bracket.

d. *Exhaust System.* Fresh air from the combustion blower forces the exhaust fumes out the back of the coolant heater, through an exhaust pipe, into an exhaust air chamber welded to the bulkhead behind the driver's seat.

e. **Electrical System.** A wiring harness connects the coolant heater control box, mounted in the cab, to the coolant heater receptacle. The radio receptacle and heater wiring harness carries power from the bus bar in the carrier battery box to the coolant heater control box. One lead in the coolant heater wiring harness carries electrical power to the coolant heater fuel pump and the heater coolant pump. The control box contains a circuit breaker, indicator light, run-off-start switch, and hi-lo switch.

f. **Coolant Circulating System.** An electrically operated coolant pump, mounted to the rear of the coolant heater, circulates coolant through the heater, engine, battery box heat exchanger, and back to the coolant heater, in that order. A vent hose connects the system to the top of the carrier radiator. A coolant shutoff valve, located on the engine coolant crossover pipe, stops the flow of coolant through the coolant heater when the heater is not in operation.

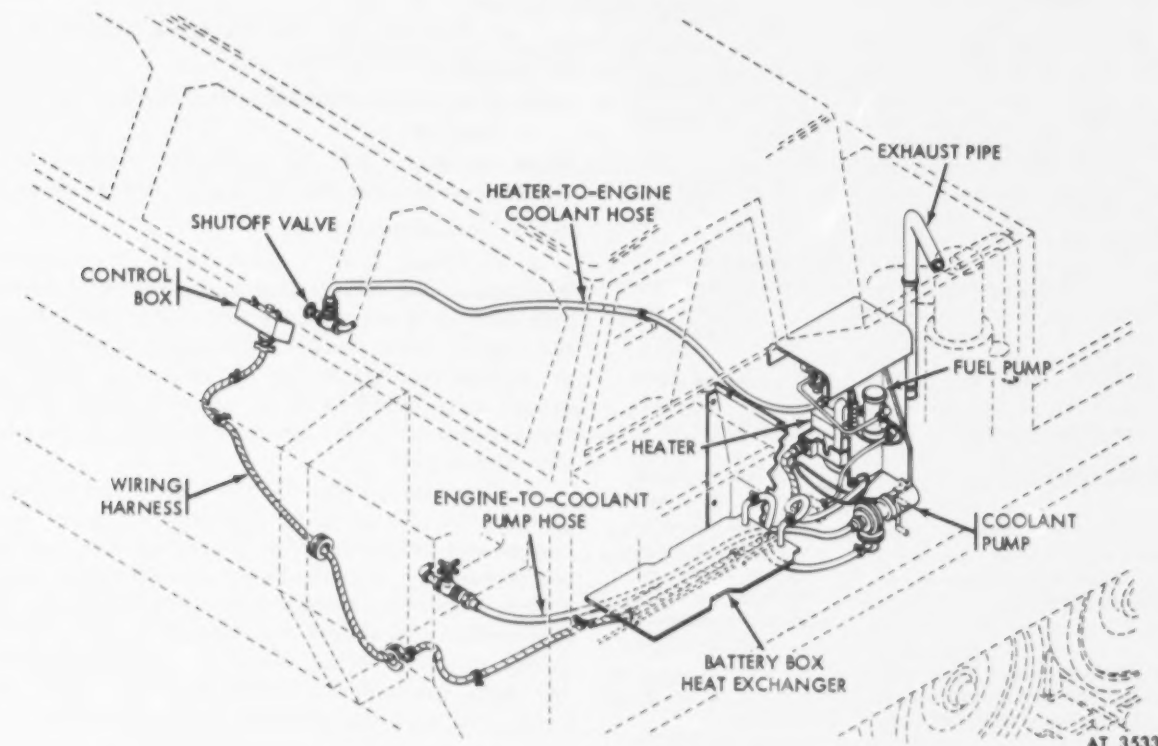


Figure 3-18. Engine coolant heater kit—schematic.

3-28. Tabulated Data

Refer to table 3-8 for tabulated data pertaining to the engine coolant heater.

3-29. Service Upon Receipt of Materiel

a. **General.** Inspect the materiel to be sure it is in condition for use. Clean and prepare the materiel for service. Make a record of any missing or damaged parts and of any malfunctions. Correct deficiencies. Report serious deficiencies which appear to involve unsatisfactory design or material on DA Form 2407.

b. Specific Procedures.

- (1) Inspect all assemblies, subassemblies, and components to be sure they are properly assembled and secured.
- (2) Perform the before-operation checks and services (TM 9-1450-585-10).
- (3) Perform the quarterly preventive-maintenance checks and services (para 3-30).

Table 3-8. Engine Coolant Heater Kit Tabulated Data

Manufacturer	Stewart-Warner
Model	939-J24
Ordinance number	11601698 (19207)
Heat output (at 70° F. surrounding air temperature):	
Coolant:	
High heat	15,000 btu / hr
Low heat	8,000 btu / hr
Operating temperature range (surrounding):	-65° F. to $\pm$ 100° F.
Electrical requirements:	
Operating voltage	20 to 28.5v
Amperes draw (maximum above 70° F.):	
Start	12.0 amp
Run	1.5 amp
Amperes draw (maximum below 70° F.):	
Start	15.0 amp
Run	3.5 amp
Performance:	
Fuel	All hydrocarbon fuel in a range from Grade 1 diesel fuel to gasoline.
Fuel rate:	
High flow (normal)	0.021 to 0.031 lb / min
Low flow (normal)	0.008 to 0.014 lb / min
Fuel pressure	3 to 15 psig at fuel valve inlet
Operating capability	capable of operating against 0.75 in. H ₂ O exhaust restriction.
Radio suppression	radio suppressed in accordance with spec MIL-S-10379.
Temperature settings:	
Overheat thermostat (opens)	245° F.
Restriction thermostat:	
Opens	190° F.
Closes	120° F.

Table 3-8. Engine Coolant Heater Kit Tabulated Data—

Continued

Dimensions and weight:	
Length	15-5 / 16 in.
Width	6 1/4 in.
Height	9 1/2 in.
Weight	15 lb
Coolant pump:	
Current draw (maximum)	2.0 amp
Output (3 foot head)	12 to 13 gpm
Weight (maximum)	10 lb

(4) Perform the after-operation checks and services (TM 9-1450-585-10).

3-30. Preventive-Maintenance Checks and Services

Refer to table 3-9 for preventive-maintenance checks and services for the engine coolant heater.

3-31. Troubleshooting

a. *General.* This paragraph contains troubleshooting information and tests for locating and correcting the troubles which may develop in the engine coolant heater. Each symptom of trouble or malfunction given for an individual unit or system is followed by a list of probable causes of the trouble and corrective actions necessary to remedy the malfunction.

b. *Troubleshooting Table.* Table 3-10 lists possible malfunctions (symptoms), probable causes, and corrective action (remedies) that can be performed by organizational maintenance personnel. Probable causes are listed in their order of probability and should be checked in that order during troubleshooting. Refer to TM 9-1450-585-10 for operational troubleshooting, and to paragraph 3-32 for electrical troubleshooting.

Table 3-9. Engine Coolant Heater Preventive-Maintenance Checks and Services

1st Echelon			Weekly Schedule
Sequence number	Item to be Inspected	Procedure	Paragraph Reference
1	Engine coolant heater	Check operation of coolant heater. Repair or replace coolant heater if defective.	Para 3-38.
2	Tubes and fittings	Check fuel tubes and fittings for evidence of leaks, cracks, and broken condition. Tighten connections. Replace defective tubes and fittings. Clean fuel pump screen.	Para 3-34 and para 3-35.
3	Coolant pump	Check operation of coolant pump. Replace coolant pump if defective.	Para 3-36.
4	Hoses and fittings	Check heater hoses and fittings for evidence of leaks. Tighten hose clamps. Replace defective hoses and fittings.	Para 3-37.
5	Heater control box	Check heater control box for chipped, cracked, and broken condition. Repair or replace as required.	Para 3-38.
6	Heater wiring harness	Check wiring harness for frayed condition and missing or broken terminals. Tape frayed harness. Replace missing or broken terminals.	Para 2-97.

Table 3-10. Engine Coolant Heater Troubleshooting

Malfunction	Probable Cause	Corrective Action
1. Coolant heater fails to start when run-off-start switch is in START position.	a. Restricted fuel strainer b. Restricted fuel tubes c. Low fuel pump output pressure. d. Wrong fuel in heater system. e. Loose electrical connections or defective fuel electrical circuit. f. Loose electrical connections; defective heater component or electrical circuit.	a. Service fuel pump strainer (para 3-34). b. Disconnect fuel tubes (para 3-35) and clean with compressed air, if air does not pass through freely, replace fuel tubes (para 3-35). c. Check fuel pump output pressure (para 3-34). If fuel pump pressure is below 4 psi, replace pump (para 3-34). d. Check fuel and replace (TM 9-1450-585-101). e. Check connections at fuel pump, heater wiring harness, and control box (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). f. Push indicator light cover, and check connections at control box and heater (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32).
2. Coolant heater blower runs when run-off-start switch is in START position, but heater does not ignite.	a. Restricted fuel strainer b. Low fuel pump output pressure. c. Loose electrical connections or defective ignitor. d. Loose electrical connections or defective fuel control valve. e. Loose electrical connections or defective overheat thermostat. f. Loose electrical connections or defective resistor assembly. g. Out of fuel	a. Service fuel strainer (para 3-34). b. Check fuel pump output pressure (para 3-34). If pump pressure is below 4 psi, replace pump (para 3-34). c. Check connections on terminal strip and ignitor (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). d. Check connections on overheat thermostat, restriction thermostat, and terminal strip (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). e. Check connections on terminal strip and overheat thermostat (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). f. Check connections on terminal strip and resistor assembly (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). g. Replenish fuel supply (TM 9-1450-585-101).
3. Coolant heater blower runs when run-off-start switch is in START position and heater ignites but indicator light does not light.	a. Loose electrical connections or defective indicator lamp or light. b. Loose electrical connections or defective flame detector switch.	a. Push indicator light cover (TM 9-1450-585-101). If light does not light, check connections at control box and circuit breaker (para 3-32). Replace lamp if defective. If above does not remedy malfunction, troubleshoot circuit (para 3-32). b. Check connections on control box, heater, terminal strip, and flame detector switch (para 3-32). Adjust flame detector switch (para 3-44). If above does not

Table 3-10. Engine Coolant Heater Troubleshooting—Continued

Malfunction	Probable Cause	Corrective Action
3. Continued		remedy malfunction, troubleshoot circuit (para 3-32). If electrical troubleshooting does not remedy malfunction, replace flame detector switch (para 3-44).
4. Coolant heater starts but goes off later.	a. Air trapped in heater cooling system. b. Loose electrical connections or defective coolant pump. c. Loose electrical connections or defective overheat thermostat. d. Out of fuel or ice in fuel lines.	a. Fill carrier cooling system (para 2-81). b. Check connections on terminal strip and coolant pump (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). c. Check connections on terminal strip and overheat thermostat (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). d. Replenish fuel supply (TM 9-1450-585-10).
5. Coolant heater overheats.	a. Air trapped in heater cooling system. b. Loose electrical connections or defective coolant pump. c. Loose electrical connections or defective overheat thermostat. d. Restricted coolant flow	a. Fill carrier cooling system (para 2-18). b. Check connections on terminal strip and coolant pump (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). c. Check connections on terminal strip and overheat thermostat (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). d. Remove restriction.
6. Coolant heater output too low.	a. Loose electrical connections or defective fuel control valve. b. Loose electrical connections or defective restriction thermostat. c. Loose electrical connections or defective hi-lo switch.	a. Check connections on terminal strip, overheat thermostat, and restriction thermostat (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). If electrical troubleshooting does not remedy malfunction, notify direct support maintenance personnel. b. Check connections on terminal strip and restriction thermostat (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). c. Check connections on run-off-start switch and hi-lo switch (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32).
7. Coolant heater smokes excessively. NOTE Heater will smoke when using DF2.	Leaking fuel control valve	Notify direct support maintenance personnel.
8. Blower does not stop when heater is shut off. NOTE Blower will continue to run until heater purges itself.	Loose electrical connections or defective flame detector switch.	Check connections on terminal strip and flame detector switch (para 3-32). If above does not remedy malfunction, troubleshoot circuit (para 3-32). If electrical troubleshooting does not remedy malfunction, replace mechanically defective flame detector switch (para 3-44).

3-32. Electrical Troubleshooting

a. Circuit Diagram. See figure 3-19 for a circuit

diagram of the engine coolant heater electrical system.

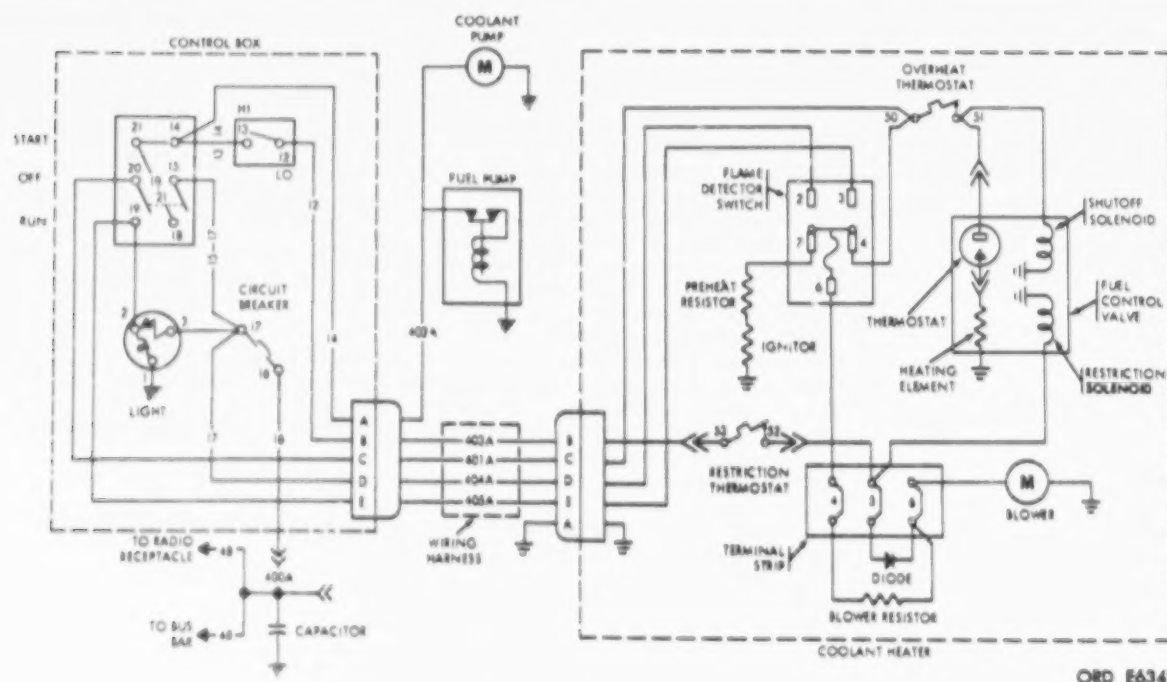


Figure 3-19. Engine coolant heater circuit diagram.

b. Circuit Numbers. Refer to table 3-11 for a list of engine coolant heater electrical circuit numbers with a brief circuit-tracer description of each circuit. The electrical leads are marked with a circuit number band attached to the function or terminal end of each lead.

c. Operational Description. The heater electrical system consists of a control box, heater assembly electrical components, electric fuel pump, coolant pump motor, and connecting leads. The control box contains a circuit breaker, run-off-start switch, hi-lo switch, and a heater indicator light. The assembly contains an overheat thermostat, flame detector switch, fuel control valve, fuel preheat resistor, ignitor, terminal strip, diode, blower resistor, restriction thermostat, and blower

motor. During the starting cycle with the hi-lo switch in LO position and the run-off-start switch in START position, current is supplied from switch terminal 14 to the coolant pump and fuel pump, and from switch terminal 20 to the overheat thermostat, control valve shutoff solenoid, control valve heating element, flame detector switch, preheat resistor, ignitor, blower resistor, and blower, starting the heater on low heat. When the flame detector switch transfers, it completes the circuit from the circuit breaker to the indicator light. During the starting cycle with the hi-lo switch in HI position, current is also supplied from switch terminal 14 to the restriction thermostat, control valve restriction solenoid, and diode, starting the heater on high heat.

Table 3-11. Engine Coolant Heater Electrical Circuit Numbers

Number	Description
1	Heater connector pin "A" to ground.
2	Flame detector switch terminal strip 2 to heater connector pin "D."
3	Heater connector pin "E" to terminal 3 of flame detector switch.
4	Flame detector switch terminal 4 to overheat thermostat.
4-6	Flame detector switch terminal 6 to terminal strip terminal 4.
5	Terminal strip terminal 5 to control valve restriction solenoid.
6	Terminal strip terminal 6 to blower motor.
7	Flame detector switch terminal 7 to resistor assembly and ignitor.
12	Hi-lo switch terminal 12 to control box connector pin "B."
13-14	Run-off-start switch terminal 19 to hi-lo switch terminal 18.
14	Run-off-start switch terminal 14 to control box connector pin "A."
14-21	Jumper from run-off-start switch terminals 14 to 21.
15-17	Circuit breaker to run-off-start switch.
16	Carrier circuit 400A lead connector to control box circuit breaker.
17	Control box circuit breaker to indicator light and control box connector pin "D."
18-21	Jumper from run-off-start switch terminals 18 and 21.
19	Control box connector pin "E" to run-off-start switch terminal 19 and to indicator light.
20	Run-off-start switch to control box connector pin "C."
48	Carrier distribution panel bus bar to radio receptacle.
50	Heater connector pin "C" to overheat thermostat.
51	Overheat thermostat to control valve shutoff solenoid thermostat, and heating element.
52	Restriction thermostat to terminal strip terminal 5.
53	Heater connector pin "B" to restriction thermostat.
100A	Control box circuit 16 to circuit 48 lead.
101A	Control box connector pin "C" to heater connector pin "C."
102A	Control box connector pin "A" to fuel pump and coolant pump.
103A	Control box connector pin "B" to heater connector pin "B."
104A	Control box connector pin "D" to heater connector pin "D."
105A	Heater connector pin "E" to control box connector pin "E."

d. Functional Description.

(1) With the vehicle master switch ON and the run-off-start switch in START position, the condition of the heater electrical system is as follows:

- (a) Circuit breaker is closed.
- (b) Indicator light is de-energized (press-to-test circuit operative only).
- (c) Run-off-start switch is energized through terminals 14, 20, and 21 from terminal 15.
- (d) Hi-lo switch is closed in HI position, open in LO position.
- (e) Fuel pump is energized.
- (f) Coolant pump is energized.
- (g) Heater electrical components are energized from terminal 20 to run-off-start switch through connector pin "C" and from connector pin "B" with hi-lo switch in HI position.
- (h) Overheat thermostat is closed.
- (i) Flame detector switch is closed through terminals 4, 6, and 7.
- (j) Control valve shutoff solenoid is open and heating element is energized (restriction solenoid open with hi-lo switch in HI position).
- (k) Preheat resistor is energized.
- (l) Ignitor is energized.

(m) Blower resistor is energized (bypassed with hi-lo switch in HI position).

(n) Blower motor is energized running on low speed (running on high speed with hi-lo switch in HI position).

(o) Restriction thermostat is de-energized (energized with hi-lo switch in HI position).

(p) Diode is de-energized (energized with hi-lo switch in HI position).

(2) With the run-off-start switch in RUN position and the heater running, the condition of the heater electrical system is as follows:

- (a) Circuit breaker is closed.
- (b) Run-off-start switch is energized through terminals 14, 18, 19, 20, and 21 from terminal 15.
- (c) Indicator light is energized from terminal 19 of run-off-start switch.
- (d) Fuel pump is energized.
- (e) Coolant pump is energized.
- (f) Hi-lo switch is closed in HI position, open in LO position.
- (g) Heater electrical components are energized from terminal 20 of run-off-start switch through connector pin "C" and from connector pin "B" with hi-lo switch in HI position.
- (h) Overheat thermostat is closed.

(i) Flame detector switch is closed through terminals 2, 3, and 6.

(j) Control valve shutoff solenoid is open and heating element is energized (restriction solenoid open with hi-lo switch in HI position).

(k) Preheat resistor is de-energized.

(l) Ignitor is de-energized.

(m) Blower resistor is energized (bypassed with hi-lo switch in HI position).

(n) Blower motor is energized running on low speed (running on high speed with hi-lo switch in HI position).

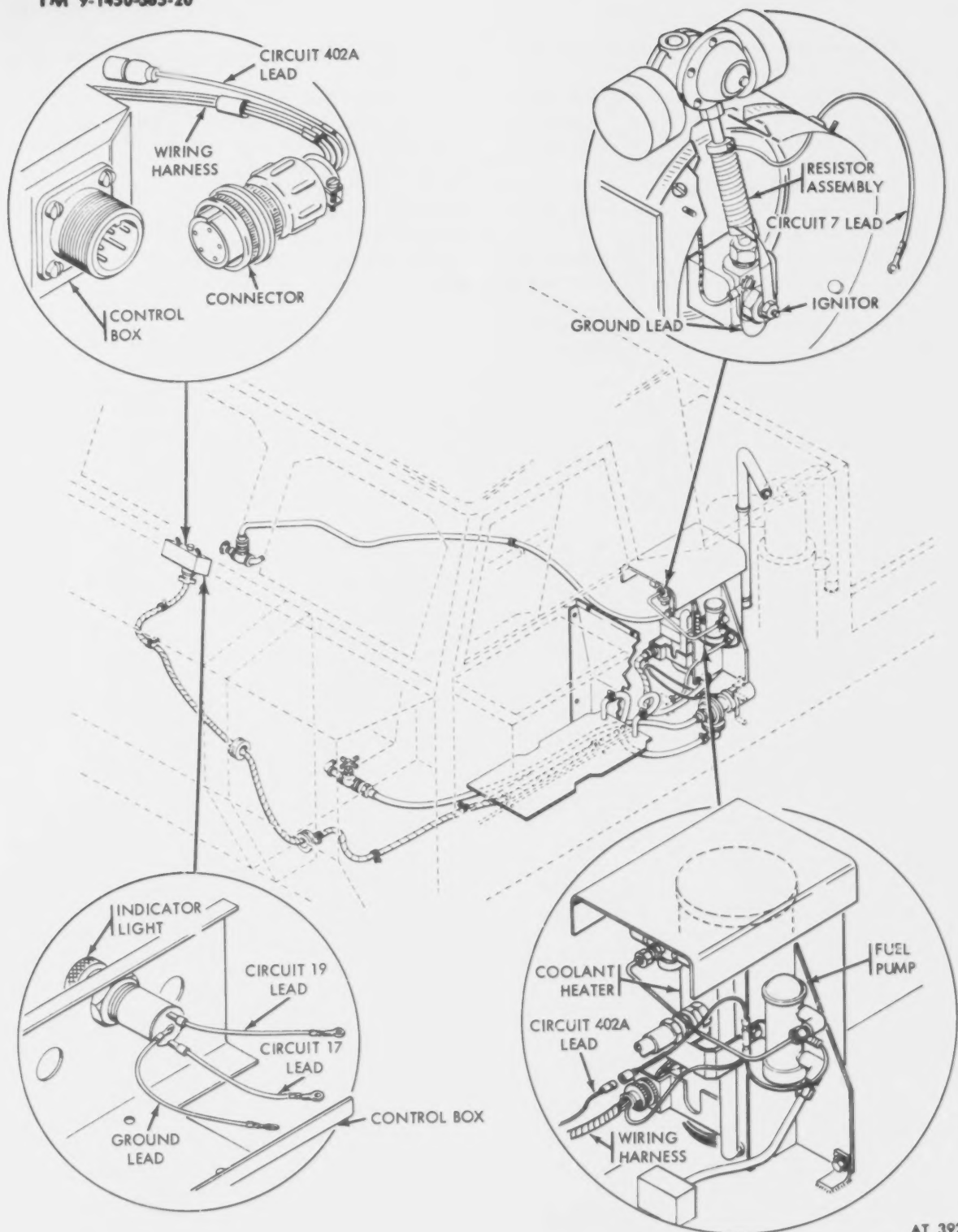
(o) Restriction thermostat is closed (energized with hi-lo switch in HI position).

(p) Diode is de-energized with hi-lo switch in HI position).

e. Troubleshooting.

(1) Refer to paragraph 2-18 for general information and paragraph 2-20 for test equipment for electrical troubleshooting.

(2) Refer to table 3-12 and see figure 3-20 for troubleshooting the engine coolant heater electrical system. Tests are given in order of probable component malfunction and should be checked in that order during troubleshooting.



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Figure 3-20. Engine coolant heater electrical system (sheet 1 of 3).

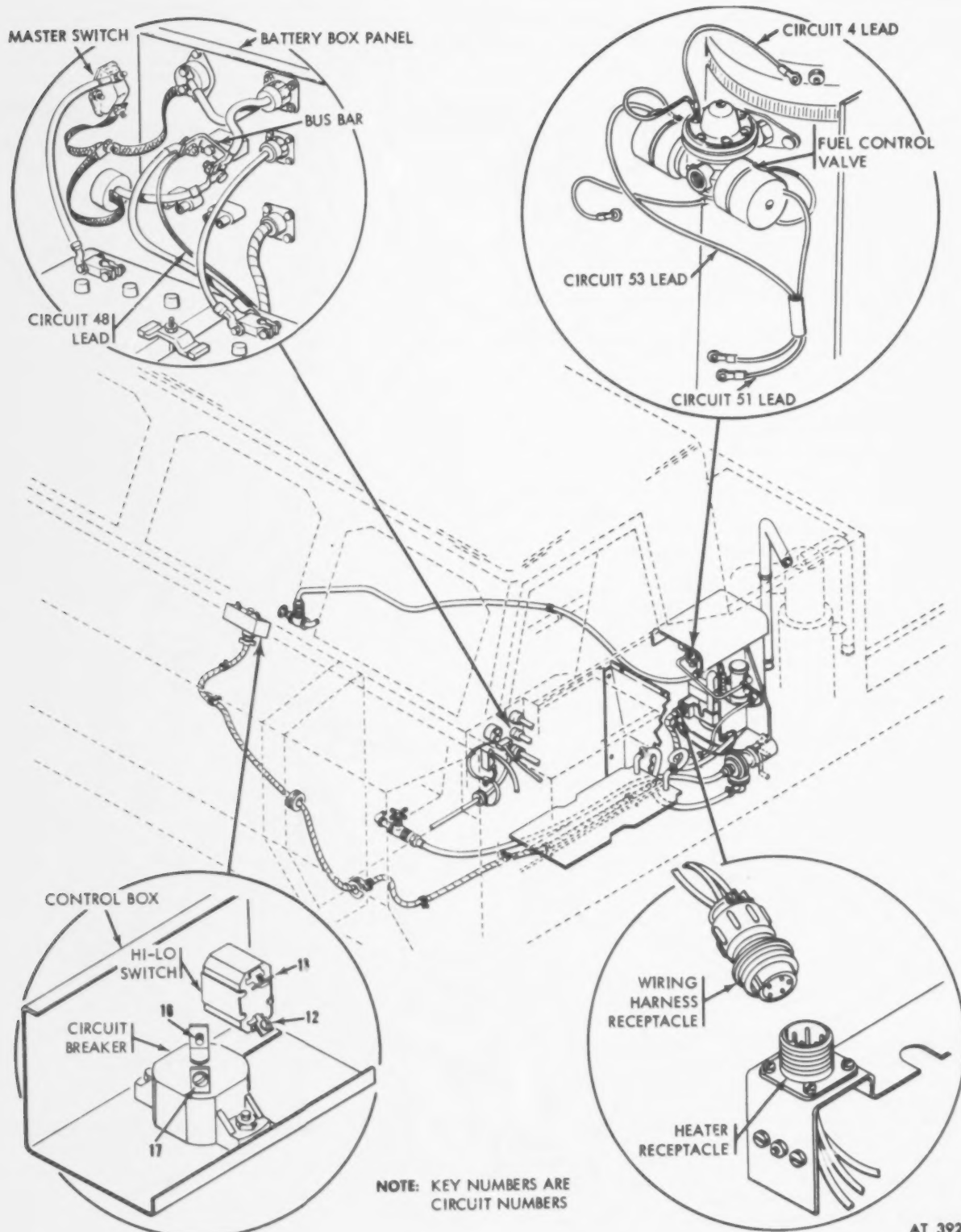


Figure 3-20. Engine coolant heater electrical system (sheet 2 of 3).

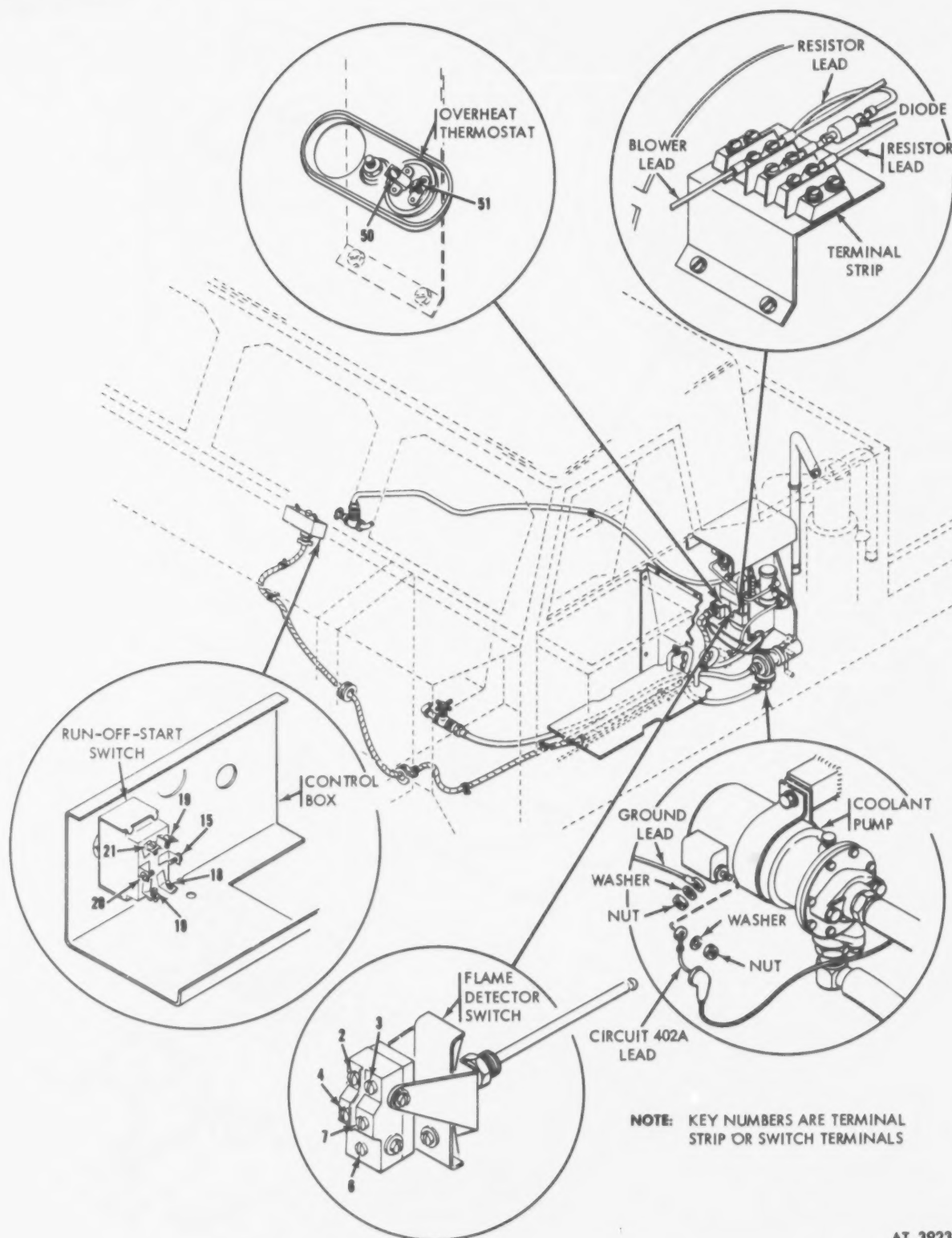


Figure 3-20. Engine coolant heater electrical system (sheet 3 of 3).

Table 3-12. Engine Coolant Heater Electrical System Troubleshooting

Engine coolant heater system malfunction	Test	
1. Coolant heater fails to start when run-off-start switch is in START position.	Test 1. Depress press-to-test cover on indicator light. If lamp comes on, perform test 2. If lamp does not come on, perform tests 14 through 19 below.	
	Test 2. Hold run-off-start switch in START position. If blower runs, perform tests 3 through 8. If blower does not run, perform tests 6 and 9 through 12 below.	
	Test 3. Disconnect circuit 402A lead from fuel pump. Check resistance from circuit 402A lead through pump to ground. Reading should be 18 to 22 ohms. If reading is not in above range, replace fuel pump (para 3-34). If pump is functional, perform test 4.	
	Test 4. Disconnect resistor assembly from ignitor. Check resistor from ignitor terminal through ignitor to ignitor housing (ground). Reading should be 0.5 to 0.6 ohm. If reading is not in above range, replace ignitor (para 3-39).	
	Test 5. Disconnect resistor assembly from ignitor and circuit 7 lead from flame detector switch. Put probes on circuit 7 lead and resistor strap to read through resistor. Reading should be 1.6 to 1.7 ohms. If reading is not in above range, resistor assembly is defective; notify direct support maintenance personnel.	
	Test 6. Disconnect circuit 4, 6, and 7 leads from terminals on flame detector switch. Check resistance from terminal 6 through switch to terminals 4 and 7. If readings are 0 ohms, switch is good. If either or both readings are infinity, replace defective switch (para 3-44). Check resistance from terminals 4 and 7 through switch. Reading should be 0 ohms. If reading is infinity, replace defective switch (para 3-44).	
	Test 7. Disconnect fuel control valve circuit 51A and 51B leads from overheat thermostat and circuit 5 lead from terminal strip. Check resistance from circuit 51A lead through valve to ground. Reading should be 130 to 160 ohms. Check resistance from circuit 5 lead through valve to ground. Reading should be 130 to 160 ohms. Check resistance from circuit 51B lead through valve to ground. Reading should be 9.7 to 10.75 ohms. If any one of the readings is not in the above ranges, fuel control valve is defective; notify direct support maintenance personnel.	
	Test 8. Disconnect circuit 50, 51A, and 51B leads from overheat thermostat. Put probes on terminals to read resistance through thermostat. If reading is 0 ohms, thermostat is good. If reading is infinity, thermostat is defective; notify direct support maintenance personnel.	
	NOTE If thermostat temperature is above 245° F., thermostat contact will open and resistance readings will be reverse of those noted in test 8.	
	Test 9. Put probes on terminals 4 and 6 of terminal strip to read resistance through blower resistor. Reading should be 0.700 to 0.765 ohm. If reading is not in above range, resistor is defective; notify direct support maintenance personnel.	
	Test 10. Disconnect blower lead from terminal strip. Check resistance from terminal through motor to ground. As fan shaft is rotated, resistance reading will vary from 0 to 5 ohms. If readings are not in above range, motor or suppressor is defective; replace coolant heater (para 3-33).	
	Test 11. Disconnect circuit 52 and 53 leads from restriction thermostat. Put probes on terminals to read resistance through thermostat. If reading is infinity, thermostat is defective; notify direct support maintenance personnel.	

Table 3-12. Engine Coolant Heater Electrical System Troubleshooting—Continued

Engine coolant heater system malfunction	Test
1. Continued	NOTE Restriction thermostat contacts open at 190° F and close at 120° F. If reading is infinity, make sure thermostat is below 120° F. Above this temperature, results are not valid. Test 12. Put probes on terminals 5 and 6 of terminal strip to read through diode. Reading should be 0 ohms from terminal 5 to 6, and 18 to 20 ohms from terminal 6 to 5. If either reading is infinity, diode is defective; notify direct support maintenance personnel. Test 13. Disconnect leads at run-off-start switch terminals 14, 15, 18, 19 and 20. Hold switch in START position, and put probes on terminals 14 - 15 and 20 - 21 and read resistance between terminals. Both readings should be 0 ohms. Place switch in OFF position, and repeat resistance checks. Both readings should be infinity. If any other readings are obtained, replace defective switch (para 3-48). Test 14. Test lamp. Check resistance from center contact to metal body of lamp. If reading indicates resistance, lamp is good. If reading is infinity, replace defective lamp (para 3-45). Test 15. Disconnect indicator light circuit 17 lead from circuit breaker, and circuit 19 lead from run-off-start switch. Check resistance from circuit 19 lead through light to ground and from circuit 17 lead, with cover pushed in, through light to ground. If reading indicates resistance, light is good. If reading is infinity or 0 ohms, replace defective light (para 3-45). Check resistance from circuit 17 lead, with cover out, through light to ground. If there is any measurable resistance, replace defective light (para 3-45). Test 16. Disconnect circuit 16 and 17 leads from circuit breaker. Put probes on terminals to read through circuit breaker. Reading should be 0 ohms. If reading is infinity, replace defective circuit breaker (para 3-47). Test 17. Disconnect circuit 16 lead from circuit breaker and circuit 48 lead from bus bar. Check resistance of disconnected leads. Reading should be 0 ohms. If reading is infinity, proceed to test 18. Test 18. Disconnect circuit 16 lead from circuit breaker and circuit 400A lead from circuit 48 lead. Put probes on disconnected ends, and read lead resistance. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 19. Disconnect connector plugs from control box and coolant heater. Put probes on cable sockets C and check resistance. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel. Test 1. Test fuel pump. Refer to malfunction 1, test 3, above. Test 2. Test ignitor. Refer to malfunction 1, test 4, above. Test 3. Test resistor assembly. Refer to malfunction 1, test 5, above. Test 4. Test overheat thermostat. Refer to malfunction 1, test 8, above. Test 5. Test fuel control valve. Refer to malfunction 1, test 7, above. Test 1. Test lamp. Refer to malfunction 1, test 14, above. Test 2. Disconnect circuit 2, 3, and 6 leads from flame detector switch. Loosen flame detector switch adjusting screw (para 3-44) until switch clicks, or a minimum of one full turn. Check resistance from terminal 6 through switch to terminals 2 and 3. If readings are 0 ohms, switch is good. If either or both readings are infinity, replace defective switch (para 3-44). Put probes on terminals 2 and 3 to read through switch. If reading is 0 ohms, switch is good. If reading is infinity,
2. Coolant heater blower runs when run-off-start switch is in START position, but heater does not ignite.	
3. Coolant heater blower runs when run-off-start switch is in START position; heater ignites, but indicator light does not light.	

**Table 3-12. Engine Coolant Heater Electrical System
Troubleshooting—Continued**

Engine coolant heater system malfunction	Test
3 Continued	replace defective switch (para 3-44). If all three readings are good, adjust switch (para 3-44).
	Test 3. Disconnect connector plugs from control box and coolant heater. Put probes on sockets E to read through lead. If reading is 0 ohms, lead is good. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
	Test 4. Disconnect connector plug from control box and circuit 19 lead from run-off-start switch. Put probes on connector pin E and end of circuit 19 lead to read through lead. If reading is 0 ohms, lead is good. If reading is infinity, lead is defective; notify direct support maintenance personnel.
	Test 5. Test indicator light. Refer to malfunction 1, test 15 above.
4. Coolant heater starts but subsequently goes out.	Test 1. Disconnect circuit 402A lead from coolant pump. Check resistance from circuit 402A lead terminal through pump motor to ground. If reading is 4.0 to 20.0 ohms, pump motor is good. If reading is not in above range, replace defective coolant pump (para 3-36).
	Test 2. Check overheat thermostat. Refer to malfunction 1, test 8, above.
5. Coolant heater overheats	Test 1. Test coolant pump. Refer to malfunction 4, test 1, above.
	Test 2. Check overheat thermostat. Refer to malfunction 1, test 8, above.
	Test 3. Check fuel control valve. Refer to malfunction 1, test 7, above.
6. Coolant heater output too low	Test 1. Check fuel control valve. Refer to malfunction 1, test 7, above.
	Test 2. Check restriction thermostat. Refer to malfunction 1, test 11, above.
	Test 3. Disconnect circuit 12 and 13-14 leads from hi-lo switch. Position hi-lo switch in HI position. Put probes on terminals to read through switch. If reading is 0 ohms, switch is good. If reading is infinity, replace defective switch (para 3-46).
	Test 4. Disconnect connector plugs from control box and coolant heater. Put probes on connector socket B to read through lead. Reading should be 0 ohms. If reading is infinity, wiring harness is defective; notify direct support maintenance personnel.
7. Blower does not stop when heater is shut off. NOTE Blower will continue to run until heater purges itself.	Test 1. Test flame detector switch. Refer to malfunction 3, test 2, above.
	Test 2. Disconnect circuit 15 - 17, 18 - 21, 19 and 20 leads from run-off-start switch. Position switch in OFF position. Put probes on terminals 15 - 18 and 19 - 20 to read through switch. Both readings should be infinity. If any other reading is obtained, replace defective switch (para 3-48).

3-33. Engine Coolant Heater (fig. 3-21)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para. 2-98).
- (2) Drain carrier cooling system (para 2-80).
- (3) Remove two screws (6) and flat washers (5) securing heater cover (4) to bracket (7), and remove cover.
- (4) Loosen clamps (9, 12, and 13) securing heater exhaust pipes (10 and 11) to heater (8) and

exhaust chamber (14), and remove pipes and clamps.

(5) Disconnect control valve-to-fuel pump tube assembly (1) from fuel control valve adapter (19) and fuel pump (3), and remove tube.

(6) Disconnect heater-to-engine hose assembly (22) from heater tube adapter (23).

(7) Disconnect battery box plate-to-heater hose assembly (21) from heater elbow (24).

(8) Disconnect wiring harness (20) from heater (8).

(9) Remove cover nut (18) securing heater-to-fuel pump ground lead (17) and washer (16) on heater (8), and remove lead and washer.

(10) Separate two heater clamps (15) securing heater (8) to bracket (7), and remove heater.

b. Inspection and Repair.

(1) Check coolant heater and components as described in electrical troubleshooting (para 3-32). Replace coolant heater or components if defective.

(2) Inspect coolant heater for cracks, dents, distortion, burn-through, and coolant leaks. Replace heater that shows any of these defects.

c. Installation.

NOTE

If replacement heater assembly is to be installed, remove elbow (24), tube adapter (23), and control valve adapter (19) from defective heater, and install on replacement heater.

(1) Position heater (8) on two saddles on bracket (7), and secure with two heater clamps (15).

(2) Position ground lead washer (16) and heater-to-fuel pump ground lead (17) on heater (8), and secure with nut (18).

(3) Connect wiring harness (20) to coolant heater (8).

(4) Connect battery box plate-to-heater hose assembly (21) to heater elbow (24).

(5) Connect heater-to-engine hose assembly (22) to heater tube adapter (23).

(6) Connect tube assembly (1) to control valve adapter (19).

(7) Position heater exhaust pipes (10 and 11)

on heater (8) and exhaust chamber (14), and secure with clamps (9, 12, and 13).

(8) Position cover (4) on bracket (7), and secure with two washers (5) and screws (6).

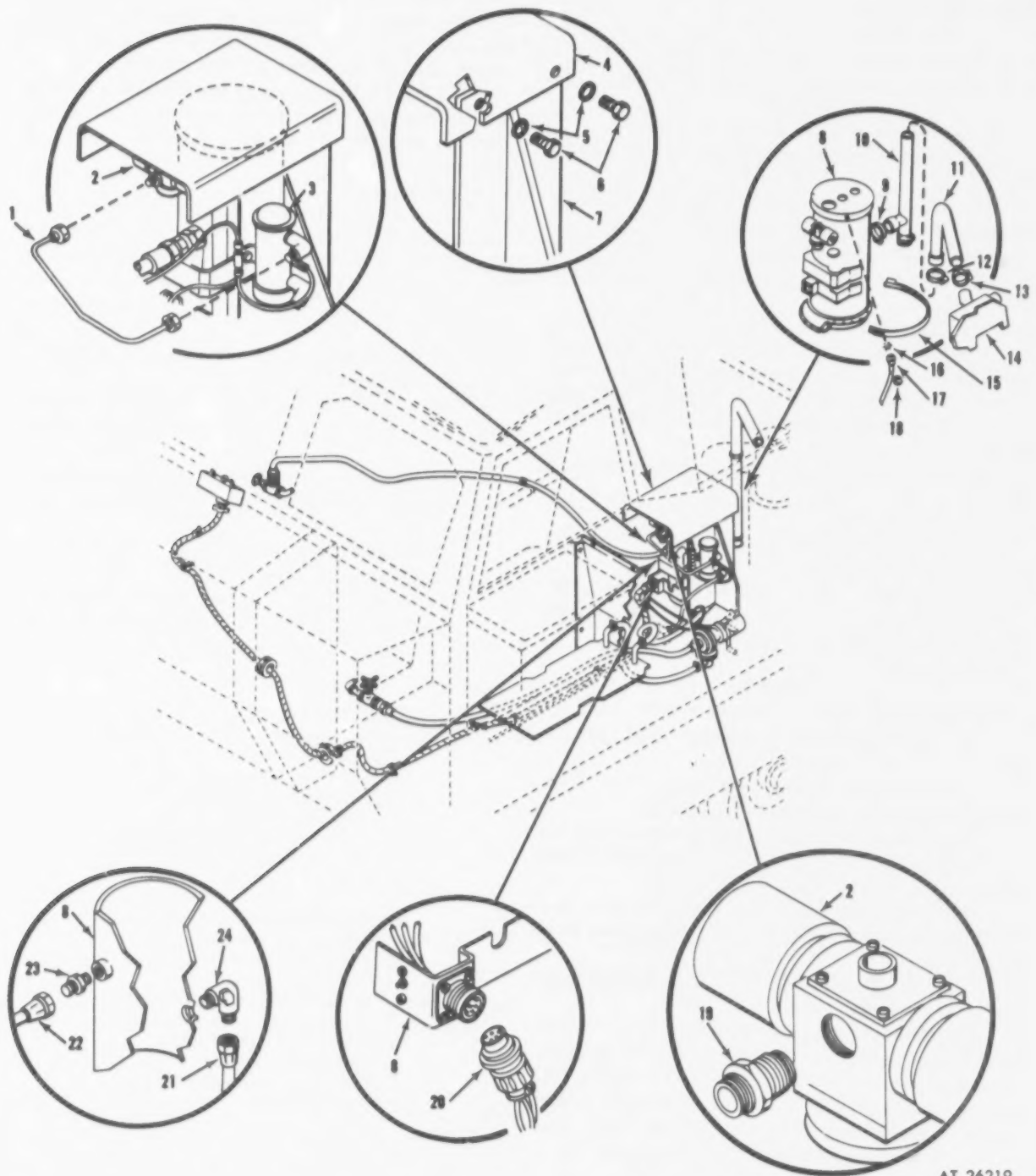
(9) Fill carrier cooling system (para 2-80).

(10) Connect battery negative lead (para 2-98).

(11) Start heater, and check operation (TM 9-1450-585-10).

LEGEND to fig. 3-21

- 1 Control valve-to-fuel pump tube assembly
- 2 Fuel control valve
- 3 Heater fuel pump
- 4 Heater cover
- 5 Cover flat washer
- 6 Cover screw
- 7 Heater bracket
- 8 Coolant heater assembly
- 9 Heater exhaust pipe clamp
- 10 Lower exhaust pipe
- 11 Upper exhaust pipe
- 12 Exhaust pipe clamp
- 13 Exhaust chamber clamp
- 14 Exhaust chamber
- 15 Heater clamp
- 16 Ground lead lock washer
- 17 Heater-to-fuel pump ground lead
- 18 Heater cover nut
- 19 Control valve adapter
- 20 Wiring harness
- 21 Battery box plate-to-coolant heater hose assembly
- 22 Heater-to-engine hose assembly
- 23 Heater tube adapter
- 24 Heater elbow



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Figure 3-21. Engine coolant heater.

3-34. Fuel Pump

(fig. 3-22)

- a. *Service.* Refer to paragraph 3-9 a.
- b. *Testing Fuel Pump Output Pressure.*

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Disconnect pump-to-heater fuel tube assembly (1) from pump outlet elbow (5).
- (3) Install pressure gage between pump-to-heater fuel tube assembly (1) and pump outlet elbow (5).
- (4) Connect battery negative lead (para 2-98).
- (5) Start heater (TM 9-1450-585-10), and check pressure on gage. Gage should read between 6½ to 7¼ psi. If reading is not within limits, stop heater (TM 9-1450-585-10), and replace fuel pump (c and e below).
- (6) Disconnect battery negative lead (para 2-98).
- (7) Remove pressure gage.
- (8) Connect pump-to-heater fuel tube assembly (1) to pump outlet elbow (5).
- (9) Connect battery negative lead (para 2-98).
- (10) Start coolant heater (TM 9-1450-585-10), and check for fuel leaks.

c. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Disconnect fuel pump lead (19) from wiring harness circuit 402A lead (14).
- (3) Disconnect pump-to-heater tube assembly (1) from pump outlet elbow (5) and fuel control valve adapter (16), and remove tube.
- (4) Disconnect fuel pump inlet hose assembly (6) from manifold reducer (7), and remove hose from inlet elbow (4).
- (5) Remove inlet elbow (4) and outlet elbow (5) from fuel pump (3).
- (6) Remove two fuel pump nuts (17), two lock washer (18), four ground lead lock washers (11), and two screws (13) securing fuel pump (3), wiring harness ground lead (12), and heater-to-fuel pump ground lead (15) to bracket (10), and remove fuel pump. Discard lock washers.

d. Inspection and Repair.

(1) Inspect fuel pump for dents in case and damaged inlet and outlet threads. Replace fuel pump that shows either of these defects.

(2) Check fuel pump as described in electrical troubleshooting (para 3-32), and test fuel pump output pressure (b above). Replace pump if defective.

e. Installation.

(1) Position wiring harness ground lead (12), heater-to-fuel pump ground lead (15), and fuel pump (3) on bracket (10), and secure with two screws (13), four new ground lead lock washers (11), two new lock washers (18), and two nuts (17).

(2) Install inlet elbow (4) and outlet elbow (5) on fuel pump (3).

(3) Install inlet hose assembly (6) on inlet elbow (4), and connect hose to manifold reducer (7).

(4) Connect pump-to-heater tube assembly (1) to pump outlet elbow (5) and fuel control valve adapter (16).

(5) Connect fuel pump lead (19) to wiring harness circuit 402A lead (14).

(6) Connect battery negative lead (para 2-98).

(7) Start heater (TM 9-1450-585-10), and check operation of fuel pump.

LEGEND to fig. 3-22

- 1 Pump-to-heater fuel tube assembly
- 2 Fuel control valve
- 3 Fuel pump
- 4 Inlet elbow
- 5 Pump outlet elbow
- 6 Fuel pump inlet hose assembly
- 7 Manifold reducer
- 8 Preformed packing
- 9 Fuel manifold
- 10 Heater bracket
- 11 Ground lead washer
- 12 Wiring harness ground lead
- 13 Fuel pump screw
- 14 Wiring harness circuit 402A lead
- 15 Heater-to-fuel pump ground lead
- 16 Fuel control valve adapter
- 17 Fuel pump nut
- 18 Fuel pump lock washer
- 19 Fuel pump lead

3-35. Fuel Tube Assembly, Hose Assembly, and Fittings (fig. 3-22)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Disconnect tube assembly (1) from pump outlet elbow (5) and control valve adapter (16), and remove tube assembly.

(3) Remove control valve adapter (16) from control valve (2).

(4) Disconnect pump inlet hose assembly (6) from manifold reducer (7), and remove hose from inlet elbow (4).

(5) Remove pump inlet elbow (4) and outlet elbow (5) from fuel pump (3).

(6) Remove reducer (7) and preformed packing (8) from fuel manifold (9). Discard preformed packing.

b. Inspection and Repair.

(1) Inspect tube assembly for dents and burred, cracked, or damaged end fittings. Replace tube assembly that shows any of these defects.

(2) Inspect hose assembly for deterioration and burred, cracked, or damaged end fittings. Replace hose assembly that shows any of these defects.

c. Installation.

(1) Install new preformed packing (8) and reducer (7) in fuel manifold (9).

(2) Install pump inlet elbow (4) and outlet elbow (5) on fuel pump (3).

(3) Install hose assembly (6) in inlet elbow (4), and connect hose to manifold reducer (7).

(4) Install control valve adapter (16) in control valve (2).

(5) Connect tube assembly (1) to outlet elbow (5) and control valve adapter (16).

(6) Connect battery negative lead (para 2-98).

(7) Start coolant heater (TM 9-1450-585-10), and check for fuel leaks.

3-36. Coolant Pump

(fig. 3-23)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Drain carrier cooling system (para 2-80).

(3) Loosen hose clamp (15), and remove engine-to-pump hose (14) from coolant pump (4).

(4) Loosen hose clamp (12), and remove pump-to-plate coil hose (13) from pump (4).

(5) Remove nut (1) and lock washer (2), and remove ground lead (3) from pump (4).

(6) Remove nut (6), and remove circuit 402A lead (5) from pump (4).

(7) Remove two cap screws (7) and flat washers (8) from clamp (9).

(8) Remove clamp (9) and support (10), and remove pump (4).

b. Inspection and Repair.

(1) Inspect pump for evidence of coolant leaks. If any leaks are evident, replace pump.

(2) Check coolant pump as described in electrical troubleshooting (para 3-32). Replace pump if defective.

NOTE

If replacement pump is to be installed, remove elbow (11) and adapter (16) from defective pump, and install on replacement pump.

c. Installation.

(1) Secure pump (4) to sponson with clamp (9), support (10), two cap screws (7), and flat washers (8).

(2) Secure circuit 402A lead (5) to pump (4) with nut (6).

(3) Secure ground lead (3) to pump (4) with lock washer (2) and nut (1).

(4) Connect pump-to-plate coil hose (13) to pump (4), and tighten hose clamp (12).

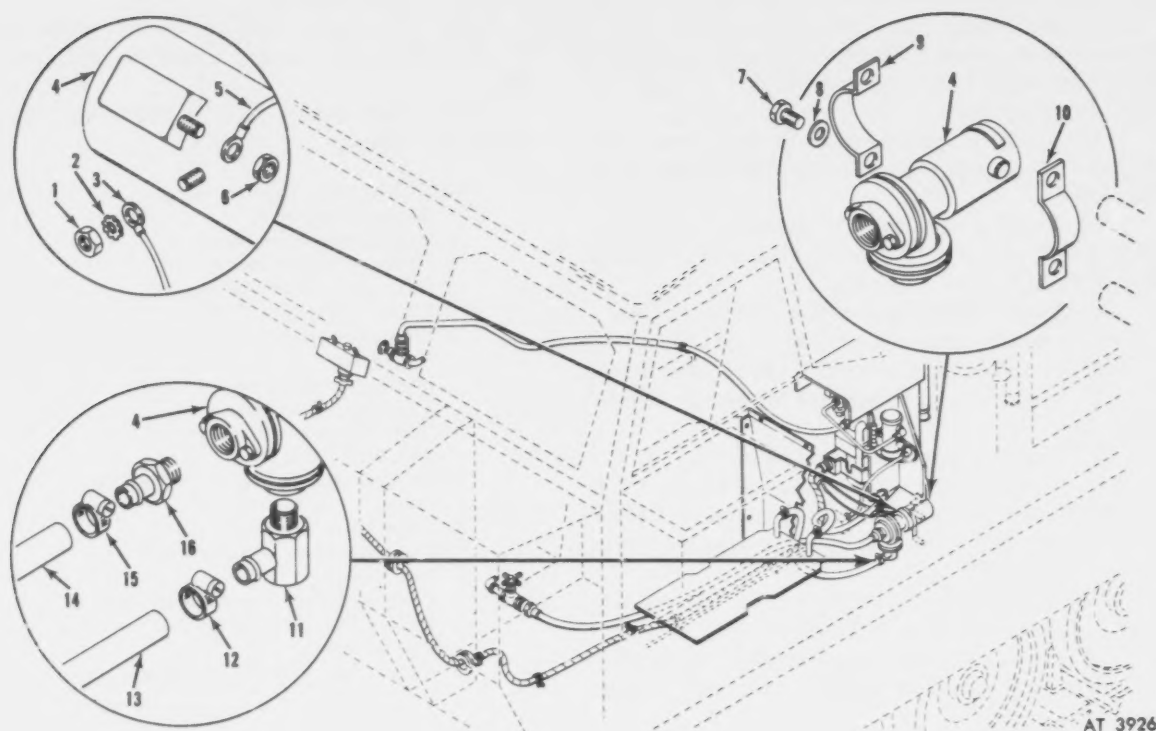
(5) Connect engine-to-pump hose (14) to pump (4), and tighten hose clamp (15).

(6) Fill carrier cooling system (para 2-80).

(7) Connect battery negative lead (para 2-98).

LEGEND to fig. 3-23

- 1 Ground lead nut
- 2 Ground lead lock washer
- 3 Ground lead
- 4 Coolant pump assembly
- 5 Circuit 402A lead
- 6 Circuit 402A lead nut
- 7 Cap screw
- 8 Coolant pump flat washer
- 9 Pump clamp
- 10 Pump support
- 11 Pump elbow
- 12 Pump-to-plate hose clamp
- 13 Pump-to-plate coil hose
- 14 Engine-to-pump hose
- 15 Hose clamp
- 16 Pump adapter



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Figure 3-23. Coolant pump.

3-37. Coolant Hoses and Fittings (fig. 3-24)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Drain carrier cooling system (para 2-80).
- (3) Remove two screws (7) and nuts (9) securing clamps (6) to clamps (8), and remove clamps (6) from heater-to-engine hose assembly (3).
- (4) Disconnect hose assembly (3) from heater (28) and engine inlet valve (1).
- (5) Remove machine screw (20) and nut (22) securing clamp (21) to clamp (23), and remove clamp (21) from engine-to-pump hose assembly (19).
- (6) Loosen hose clamp (18) on hose assembly (19).
- (7) Disconnect hose assembly (19) from pump (15) and engine outlet valve (25).
- (8) Loosen two hose clamps (11) on pump-to-battery box plate coil hose (12).
- (9) Disconnect coil hose (12) from pump (15)

and battery box plate coil (10) and remove two hose clamps (11).

(10) Loosen hose clamp (14) on battery box plate coil-to-heater hose assembly (13).

(11) Disconnect hose assembly (13) from battery box plate coil (10) and heater (28), and remove hose clamp (14).

(12) Remove engine outlet valve nipple (24) from outlet valve (25).

(13) Remove outlet valve (25) from elbow (26).

(14) Remove elbow (26) from engine nipple (27).

(15) Remove nipple (27) from engine.

(16) Remove engine inlet valve nipple (2) from inlet valve (1).

(17) Remove inlet valve (1) from nipple (4).

(18) Remove nipple (4) from inlet valve elbow (5).

(19) Remove inlet valve elbow (5) from engine.

b. Inspection and Repair.

(1) Inspect hoses for twists, abrasion, and excessive wear. Replace hoses that show any of these defects.

(2) Inspect fittings and hose end connections for cracks, nicks, and burred or damaged threads. Clean parts using dry cleaning solvent (SD). Remove burrs. Replace fittings and end connections that show any of the other defects.

c. Installation.

(1) Apply a light coat of sealing compound MIL-S-7916 to external tapered pipe threads after cleaning.

(2) Apply a light coat of antiseize compound MIL-A-907 to external threads of bolts and straight thread fittings after cleaning.

(3) Install inlet valve elbow (5) in engine.

(4) Install nipple (4) in inlet valve elbow (5).

(5) Install engine inlet valve (1) on nipple (4).

(6) Install engine inlet valve nipple (2) in inlet valve (1).

(7) Install nipple (27) in engine.

(8) Install elbow (26) on engine nipple (27).

(9) Install outlet valve (25) on elbow (26).

(10) Install engine outlet valve nipple (24) in outlet valve (25).

(11) Position hose clamp (14) on battery box plate coil-to-heater hose assembly (13).

(12) Connect hose assembly (13) to battery box plate coil (10) and heater (28), and tighten hose clamp (14).

(13) Position two hose clamps (11 and 18) on pump-to-battery box plate coil hose (12).

(14) Connect coil hose (12) to pump (15) and battery box plate coil (10), and tighten two hose clamps (11 and 18).

(15) Position hose clamp (18) on engine-to-pump hose assembly.

(16) Connect hose assembly (19) to pump (15) and engine outlet valve (25), and tighten hose clamp (18).

(17) Position clamp (21) on engine-to-pump hose assembly (19), and secure to clamp (23) with screw (20) and nut (22).

(18) Connect heater-to-engine hose assembly (3) to heater (28) and engine inlet valve (1).

(19) Position two clamps (6) on hose

assembly (3), and secure to clamps (8) with two screws (7) and nuts (9).

(20) Fill carrier cooling system (para 2-80).

(21) Connect battery negative lead (para 2-98).

(22) Start heater (TM 9-1450-585-10), and check for leaks.

LEGEND to fig. 3-24

- 1 Engine inlet valve
- 2 Engine inlet valve nipple
- 3 Heater-to-engine hose assembly
- 4 Inlet valve elbow nipple
- 5 Engine inlet valve elbow
- 6 Heater-to-engine hose assembly loop clamp
- 7 Heater-to-engine hose assembly loop clamp machine screw
- 8 Wiring harness and engine oil filler tube loop clamp
- 9 Heater-to-engine hose assembly loop clamp nut
- 10 Battery box plate coil
- 11 Pump-to-battery box plate coil hose clamp
- 12 Pump-to-battery box plate coil hose
- 13 Battery box plate coil-to-heater hose assembly
- 14 Battery box plate coil-to-heater hose clamp
- 15 Coolant pump
- 16 Coolant pump inlet adapter
- 17 Coolant pump outlet elbow
- 18 Engine-to-pump hose assembly hose clamp
- 19 Engine-to-pump hose assembly
- 20 Engine-to-pump hose assembly loop clamp machine screw
- 21 Engine-to-pump hose assembly loop clamp
- 22 Engine-to-pump hose assembly loop clamp nut
- 23 Bilge pump tube loop clamp
- 24 Engine outlet valve nipple
- 25 Engine outlet valve
- 26 Engine outlet valve elbow
- 27 Engine nipple
- 28 Coolant heater
- 29 Heater-to-engine hose assembly nipple
- 30 Battery box plate coil-to-heater hose assembly elbow

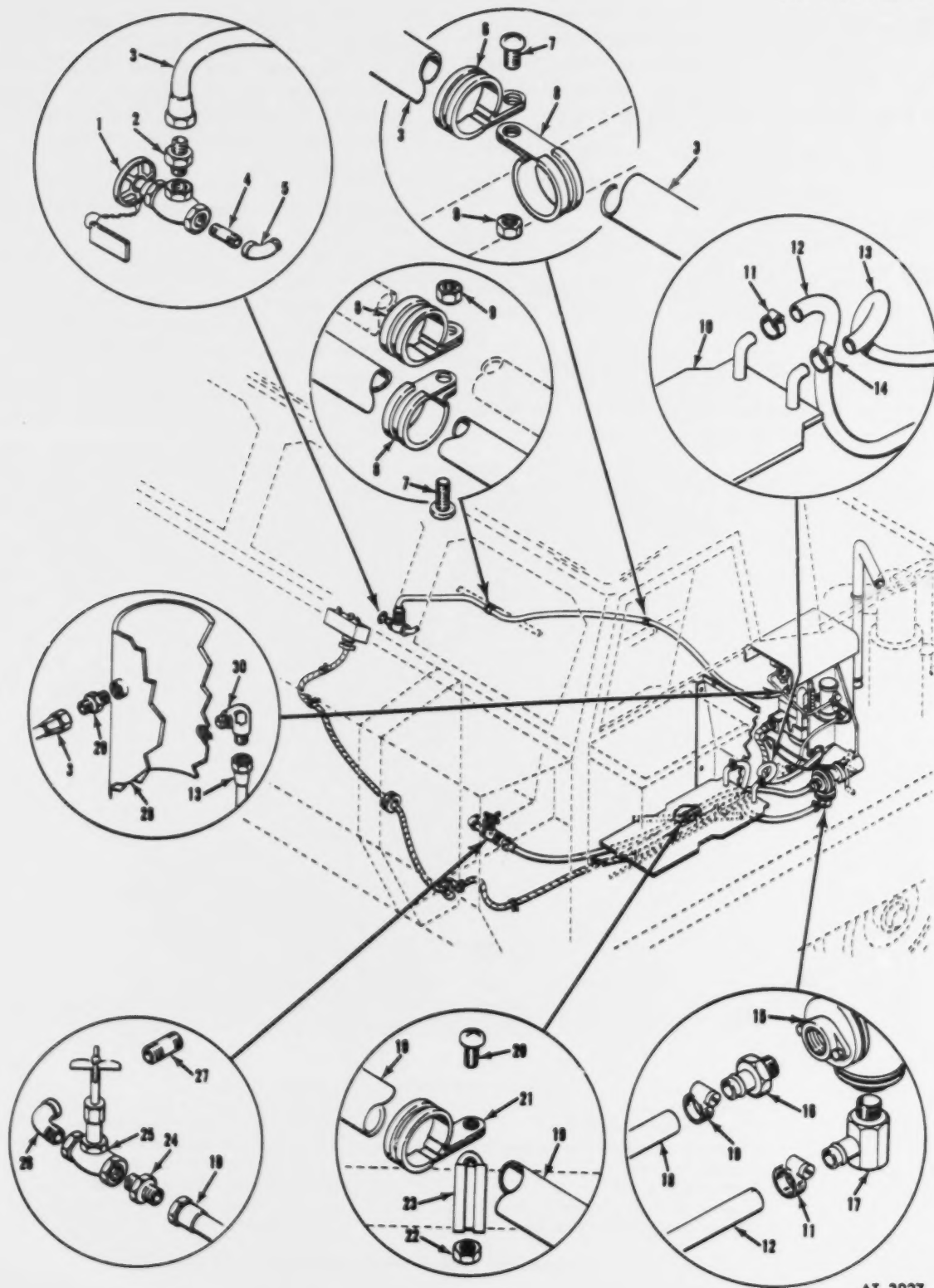


Figure 3-24. Coolant hoses and fittings—exploded view.

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3-38. Control Box (fig. 3-25)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Disconnect wiring harness (9) from control box panel (5).
- (3) Disconnect circuit 400A lead (8) from control box circuit 400A lead (7).
- (4) Remove screw (12) and two lock washers (13) securing ground lead (14) to control box case (4).
- (5) Remove two screws (6), and remove control box panel (5) from control box case (4).
- (6) Remove two cap screws (10), flat washers (2), and nuts (1) from control box case (4).

- (7) Remove control box case (4) and four mounts (11) from bracket (3).

b. *Inspection and Repair.* Check control box and control box components as described in electrical troubleshooting (para 3-32). Replace control box or components if defective.

c. Installation.

- (1) Secure control box case (4) and four mounts (11) to bracket (3) with two cap screws (10), flat washers (2), and nuts (1).
- (2) Secure control box panel (5) to control box case (4) with two screws (6).
- (3) Secure ground lead (14) to control box case (4) with screw (12) and two lock washers (13).
- (4) Connect circuit 400A lead (8) to control box circuit 400A lead (7).
- (5) Connect wiring harness (9) to control box panel (5).
- (6) Connect battery negative lead (para 2-98).

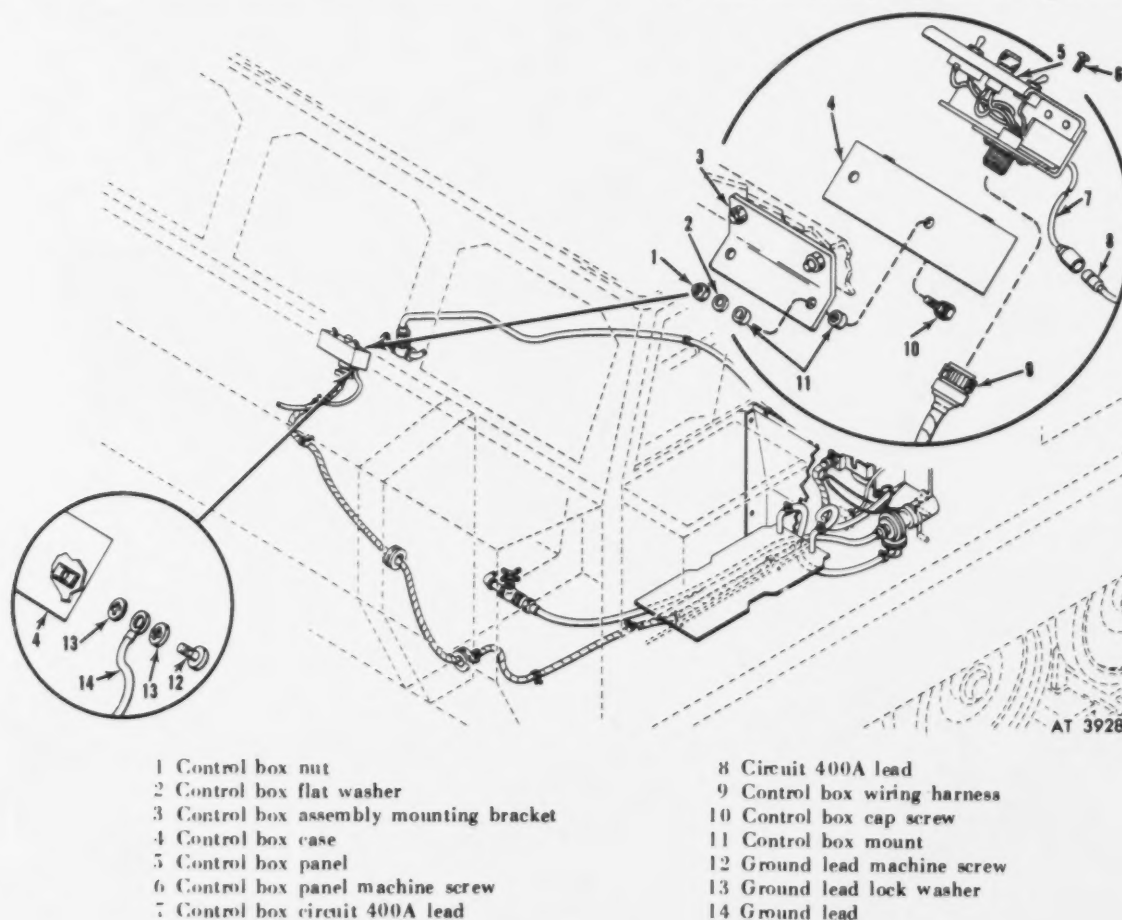


Figure 3-25. Coolant heater control box.

3-39. Ignitor (fig. 3-27)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Loosen four nuts securing end cover on coolant heater, turn cover counterclockwise, and remove from heater (fig. 3-30).

(3) Remove screw and lock washer (12) securing ignitor ground lead (11) and ground strap (13) to coolant heater.

(4) Remove two nuts (10) securing resistor strap (18) to ignitor (9), and bend resistor strap out of way.

(5) Remove ignitor (9) and ignitor gasket (8) from coolant heater. Discard gasket.

b. *Inspection and Repair.* Check ignitor as described in electrical troubleshooting (para 3-32). Replace ignitor if defective.

c. Installation.

(1) Install ignitor (9) with new ignitor gasket (8) in coolant heater.

(2) Position resistor strap (18) on ignitor (9), and secure with two nuts (10).

(3) Position ignitor ground lead (11) and ground strap (13) on coolant heater, and secure with screw and lock washer (12).

(4) Position end cover on coolant heater, turn cover clockwise, and secure with four nuts (fig. 3-30).

(5) Connect battery negative lead (para 2-98).

(6) Start engine coolant heater (TM 9-1450-585-10), and check operation of ignitor.

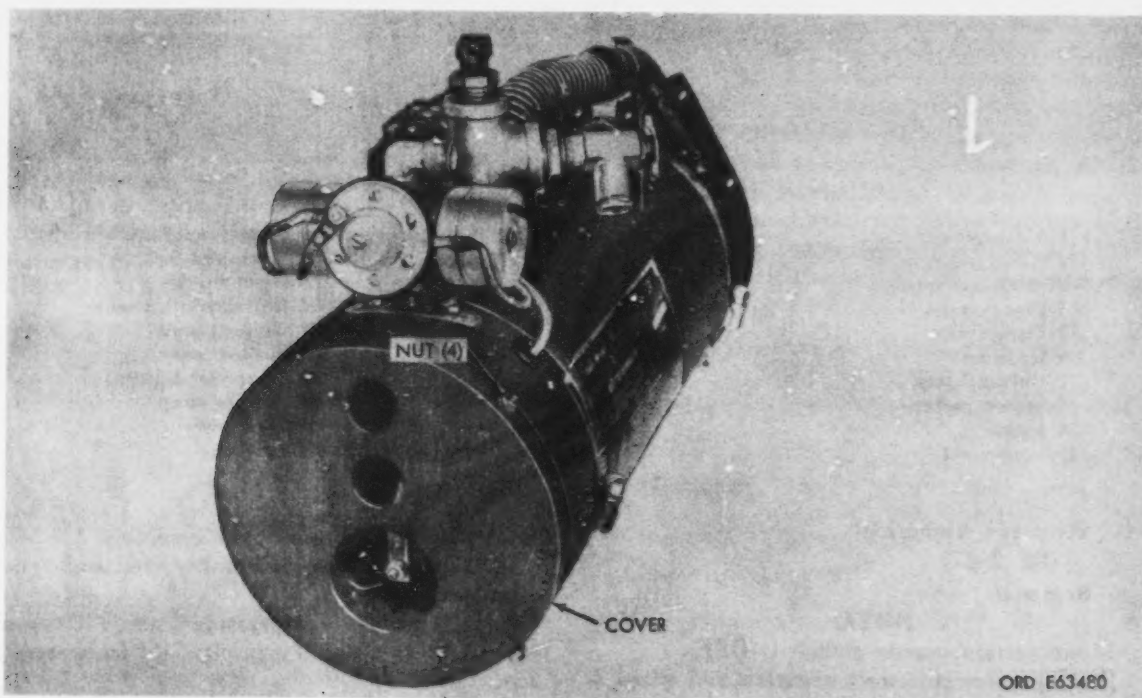
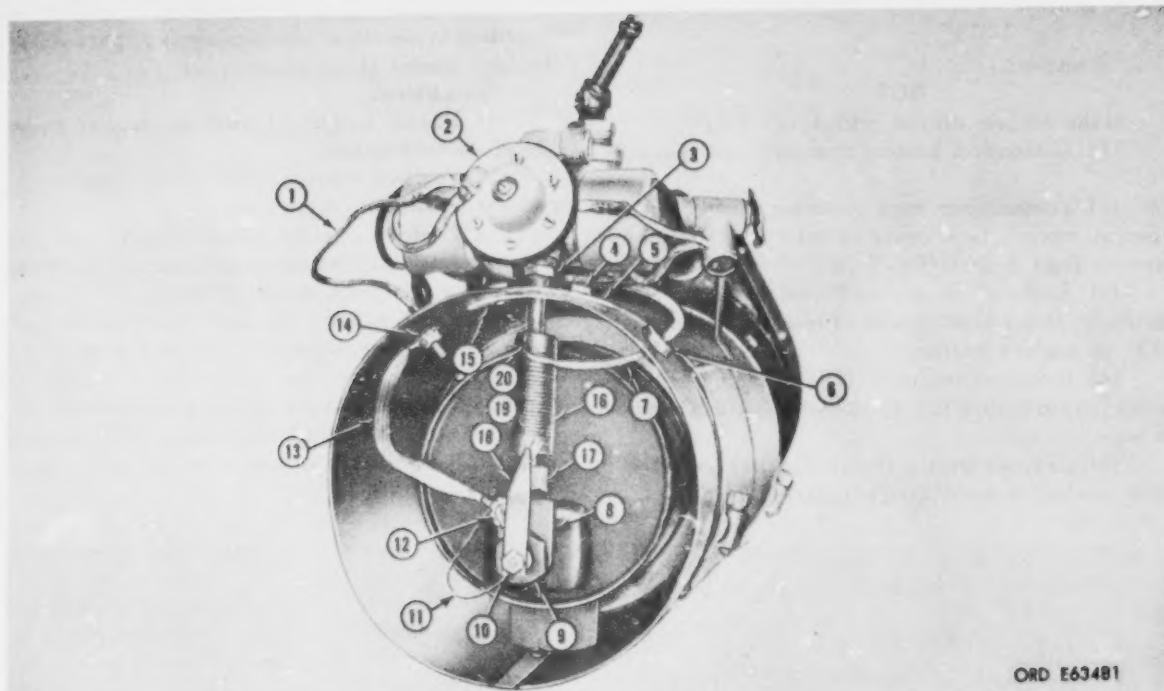


Figure 3-26. Coolant heater end cover.



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- 1 Valve ground lead
- 2 Fuel control valve
- 3 Standpipe assembly
- 4 Flange screw
- 5 Flange plate
- 6 Grommet
- 7 Circuit 7 lead
- 8 Ignitor gasket
- 9 Ignitor
- 10 Ignitor nut

- 11 Ignitor round lead
- 12 Screw and lock washer
- 13 Ground strap
- 14 Nut and lock washer
- 15 Tapping plate
- 16 Resistor assembly
- 17 Compression fitting
- 18 Resistor strap
- 19 Lead screw
- 20 Lead nut

Figure 3-27. Coolant heater ignitor.

3-40. Resistor Assembly (fig. 3-27)

a. Removal.

NOTE

Make certain master switch is OFF.

- (1) Disconnect battery negative lead (para 2-98).
- (2) Remove fuel control valve (para 3-43).
- (3) Loosen four nuts securing end cover on coolant heater, turn cover counterclockwise, and remove from heater (fig. 3-26).
- (4) Remove two screws (4, fig. 3-27) from flange plate (5), and remove tapping plate (15).
- (5) Remove screw (19), nut (20), and circuit 7 lead (7) from resistor (16).
- (6) Remove nut (10) from ignitor (9).
- (7) Bend resistor strap (18) out of way.
- (8) Loosen compression fitting (17) securing standpipe assembly (3) to coolant heater.

(9) Remove standpipe assembly (3), flange plate (5), and resistor assembly (16) from coolant heater.

(10) Remove compression fitting (17), resistor assembly (16), and flange plate (5) from standpipe (3).

b. Inspection and Repair.

(1) Check resistor assembly as described in electrical troubleshooting (para 3-32). Replace resistor assembly if defective.

(2) Inspect standpipe assembly and ferrule for damage. Replace ferrule and standpipe if either was damaged in removal.

c. Installation.

(1) Position compression fitting (17), resistor assembly (16), and flange plate (5) on standpipe (3).

(2) Install standpipe assembly (3), flange

plate (5), and resistor assembly (16) in coolant heater.

(3) Tighten compression fitting (17) to secure standpipe assembly (3) to coolant heater.

(4) Secure resistor strap (18) to ignitor (9) with nut (10).

(5) Secure circuit 7 lead (7) to resistor assembly (16) with screw (19) and nut (20).

(6) Secure flange plate (5) and tapping plate (15) to coolant heater with two screws (4).

(7) Position end cover on coolant heater, turn cover clockwise, and secure with four nuts (fig. 3-26).

(8) Install fuel control valve (para 3-43).

(9) Connect battery negative lead (para 2-98).

3-41. Overheat Thermostat (fig. 3-28)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Remove four cap screws (9), and remove shield (4).

(3) Remove screw (20), and remove flame detector switch-to-thermostat lead (21) and connector-to-thermostat lead (25) from overheat thermostat (3).

(4) Remove screw (23), and remove thermostat-to-fuel control valve lead (24) and overheat thermostat-to-restriction thermostat lead (22) from overheat thermostat (3).

(5) Remove nut (8) and lock washer (7), and remove thermostat cover (5).

(6) Remove overheat thermostat (3) and gasket (6). Discard gasket.

b. *Inspection and Repair.* Check overheat thermostat as described in electrical troubleshooting (para 3-32). Replace overheat thermostat if defective.

c. Installation.

(1) Install overheat thermostat (3) and new gasket (6) in heater assembly (2).

(2) Secure thermostat cover (5) to heater assembly (2) with nut (8) and lock washer (7).

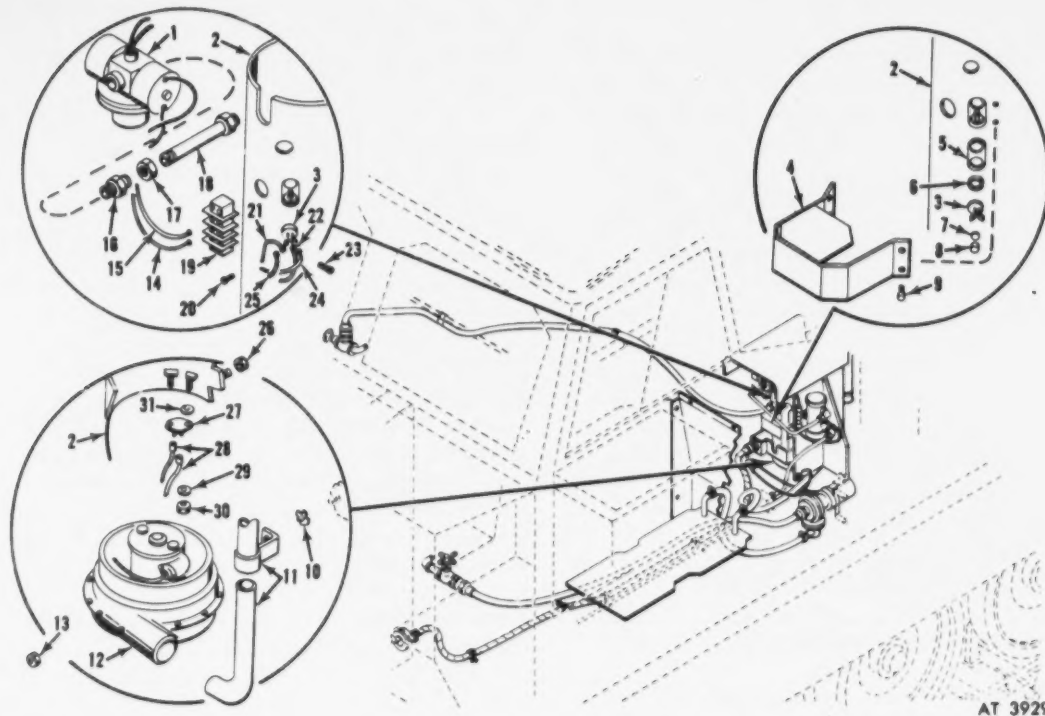
(3) Secure thermostat-to-fuel control valve lead (24) and overheat thermostat-to-restriction thermostat lead (22) to overheat thermostat (3) with screw (23).

(4) Secure flame detector switch-to-thermostat lead (21) and connector-to-thermostat lead (25) to overheat switch (3) with screw (20).

(5) Secure shield (4) to heater assembly (2) with four cap screws (9).

(6) Connect battery negative lead (para 2-98).

(7) Start heater assembly (TM 9-1450-585-10), and check operation of overheat thermostat.



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- | | | |
|--|--|---|
| 1 Fuel control valve | 12 Air blower | 22 Overheat thermostat-to-restriction thermostat lead |
| 2 Heater assembly | 13 Air blower exhaust pipe nut | 23 Fuel control valve lead screw |
| 3 Overheat thermostat | 14 Air blower lead | 24 Thermostat-to-fuel control valve lead |
| 4 Heater assembly shield | 15 Fuel control valve-to-terminal strip lead | 25 Connector-to-overheat thermostat lead |
| 5 Thermostat cover | 16 Standpipe union | 26 Air blower nut |
| 6 Overheat thermostat gasket | 17 Standpipe union nut | 27 Restriction thermostat |
| 7 Thermostat cover lock washer | 18 Standpipe | 28 Restriction thermostat lead |
| 8 Thermostat cover nut | 19 Terminal strip | 29 Thermostat washer |
| 9 Shield cap screw | 20 Flame detector switch lead screw | 30 Thermostat nut |
| 10 Air blower exhaust pipe lock washer | 21 Flame detector switch-to-thermostat lead | 31 Thermostat spacer |

Figure 3-28. Coolant heater terminal strip and restriction thermostat—exploded view.

3-42. Restriction Thermostat (fig. 3-28)

a. Removal.

NOTE

Make certain master switch is OFF

- (1) Disconnect battery negative lead (para 2-98).
- (2) Remove heater assembly (para 3-33).
- (3) Remove nut (13) and lock washer (10) from air blower exhaust pipe (11).
- (4) Remove exhaust pipe (11) from air blower (12) and heater assembly (2).
- (5) Disconnect air blower lead (14) from terminal strip (19).
- (6) Loosen four nuts (26), turn blower (12)

counter-clockwise, and remove blower. Set blower to one side.

- (7) Disconnect two leads (28) from restriction thermostat (27).

- (8) Remove two nuts (30) and washers (29) from thermostat (27).

- (9) Remove thermostat (27) and two spacers (31) from heater assembly (2).

b. *Inspection and Repair.* Check restriction thermostat as described in electrical troubleshooting (para 3-32). Replace thermostat if defective.

c. Installation.

- (1) Position two spacers (31) and thermostat (27) to heater assembly (2).

(2) Secure thermostat (27) to heater assembly (2) with two washers (29) and nuts (30).

(3) Connect two leads (28) to thermostat (27).

(4) Position blower (12) on heater assembly (2), turn blower clockwise, and tighten four nuts (26).

(5) Connect air blower lead (14) to terminal strip (19).

(6) Install exhaust pipe (11) on air blower (12) and heater assembly (2).

(7) Secure exhaust pipe (11) to heater assembly (2) with lock washer (10) and nut (13).

(8) Install heater assembly (para 3-33).

(9) Connect battery negative lead (para 2-98).

(10) Start heater assembly (TM 9-1450-585-10), and check operation of restriction thermostat.

3-43. Fuel Control Valve

(fig. 3-28)

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Disconnect battery negative lead (para 2-98).

(2) Close heater fuel shutoff cock.

(3) Disconnect thermostat-to-fuel control valve lead (24) from overheat thermostat (3).

(4) Disconnect fuel control valve-to-terminal strip lead (15) from terminal strip (19).

(5) Loosen nut (17) on union (16), and lift control valve (1) off standpipe (18).

b. *Inspection and Repair.* Check fuel control valve as described in electrical troubleshooting (para 3-32). Replace fuel control valve if defective.

c. Installation.

(1) Position control valve (1) on standpipe (18), and tighten nut (17) on union (16).

(2) Connect fuel control valve-to-terminal strip lead (15) to overheat thermostat (3).

(3) Connect thermostat-to-fuel control valve lead (24) to overheat thermostat (3).

(4) Connect battery negative lead (para 2-98).

(5) Start heater assembly (TM 9-1450-585-10), and check operation of fuel control valve.

3-44. Flame Detector Switch

(fig. 3-29)

NOTE

Switch is adjusted at assembly; readjust only when cement seal on adjusting screw is broken or operation indicates maladjustment (a (9) below).

a. Adjustment.

(1) Remove four screws (2) securing safety

bracket (1) to engine coolant heater (3), and remove bracket.

(2) Loosen two screws and nuts (5) so microswitch (6) is lightly secured to flame detector switch (8).

(3) Turn adjusting screw (7) counterclockwise until microswitch (6) clicks.

(4) Slowly turn adjusting screw (7) clockwise until microswitch (6) clicks.

(5) Turn adjusting screw (7) $\frac{3}{4}$ turn past clockwise click point of microswitch (6).

(6) Secure adjustment of adjusting screw (7) with insulating cement (Clyptal cement or Ambroid).

(7) Tighten two screws and nuts (5) securing microswitch (6) to flame detector switch (8).

(8) Install safety bracket (1) on heater (3), and secure bracket with four screws (2).

(9) Start engine coolant heater (TM 9-1450-585-10), and check operation of flame detector switch. If starting transfer time after adjustment is more than 3-1/3 minutes (200 seconds), or purge time is less than 1 minute or more than 3 minutes, replace flame detector switch.

b. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove four screws (2) securing safety bracket (1) to engine coolant heater (3), and remove bracket.

(2) Disconnect five tagged leads from terminals 2, 3, 4, 6, and 7 on flame detector switch (fig. 3-20).

(3) Loosen compression nut (4, fig. 3-29), and carefully remove flame detector switch (8) from heater (3).

NOTE

Take care not to bend flame switch tube. Tube contains a fragile quartz rod.

c. *Inspection and Repair.* Check flame detector switch as described in electrical troubleshooting (para 3-32). Replace switch if defective.

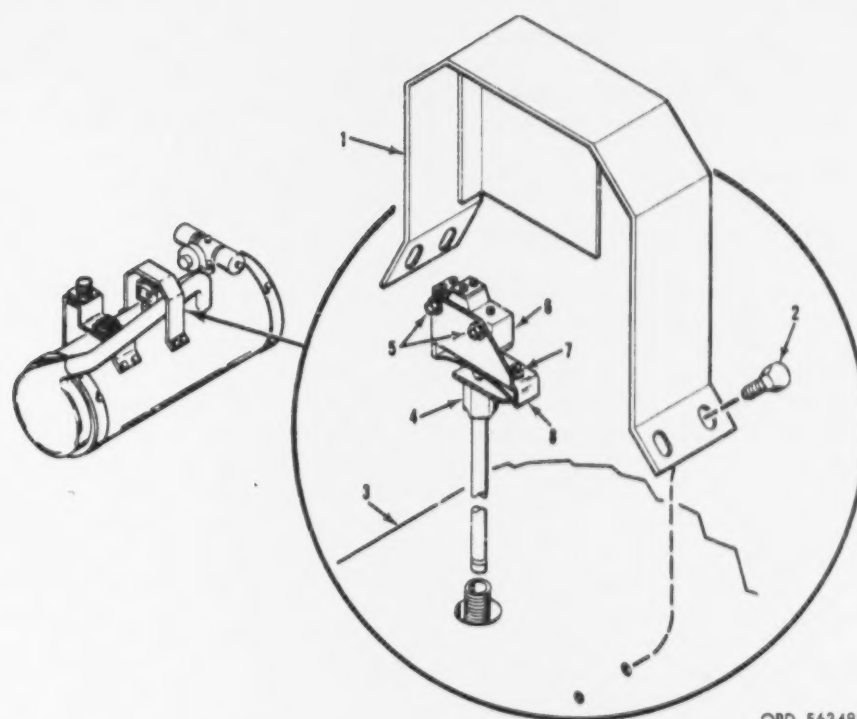
d. Installation.

(1) Carefully install flame detector switch (8) in engine coolant heater (3), and secure switch to heater with compression nut (4).

(2) Connect five tagged leads to terminals 2, 3, 4, 6, and 7 on flame detector switch (fig. 3-20).

(3) Install safety bracket (1, fig. 3-29) on heater (3), and secure bracket to heater with four screws (2).

(4) Start coolant heater (TM 9-1450-585-10), and check for correct operation of flame detector switch (a above).



- 1 Safety bracket
- 2 Bracket screw
- 3 Engine coolant heater
- 4 Compression nut

- 5 Screw and nut
- 6 Microswitch
- 7 Adjusting screw
- 8 Flame detector switch

Figure 3-29. Coolant heater flame detector switch.

3-45. Indicator Light (fig. 3-30)

NOTE

Do not remove more than one component at a time from control box panel.

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove control box panel from control box (para 3-38).

(2) Remove two screws (6) securing receptacle (8) and receptacle mounting bracket (7) to bottom of control box panel (1), and straighten out leads from receptacle to control box panel components.

(3) Remove screw and nut (18) securing ground lead (10) and circuit breaker (16) to control box panel (1), and remove ground lead from circuit breaker.

(4) Disconnect circuit 17 light lead (12) circuit 17 lead (19), and circuit 15 - 17 lead (11) from circuit breaker (16), and remove circuit 17 light lead from circuit breaker.

(5) Disconnect circuit 19 lead (4, fig. 3-31) and circuit 19 light lead (5) from run-off-start switch (7) and remove circuit 19 light lead from switch.

(6) Remove indicator lamp from indicator light (para 3-23).

(7) Remove light nut and lock washer (2) securing indicator light (4) to control box panel (1), and remove indicator light with leads.

(8) Unsolder leads from terminals of indicator light (4).

b. *Inspection and Repair.* Check indicator light as described in electrical troubleshooting (para 3-32). Replace indicator light if defective.

c. Installation.

(1) Position ground lead (10) on center terminal, circuit 19 light lead (13) on top terminal, and circuit 17 light lead (12) on bottom terminal of indicator light (4), and solder leads to terminals with solder with SN50 or SN60.

(2) If lamp is installed in indicator light, remove lamp (para 3-23).

(3) Position indicator light (4) on control box panel (1), and secure with light nut and lock washer (2).

(4) Install lamp in indicator light (para 3-23).

(5) Connect circuit 19 lead (4, fig. 3-31) and circuit 19 light lead (5) to run-off-start switch (7).

(6) Connect circuit 15 - 17 lead (11, fig. 3-30), circuit 17 lead (19), and circuit light 17 lead (12) to circuit breaker (16).

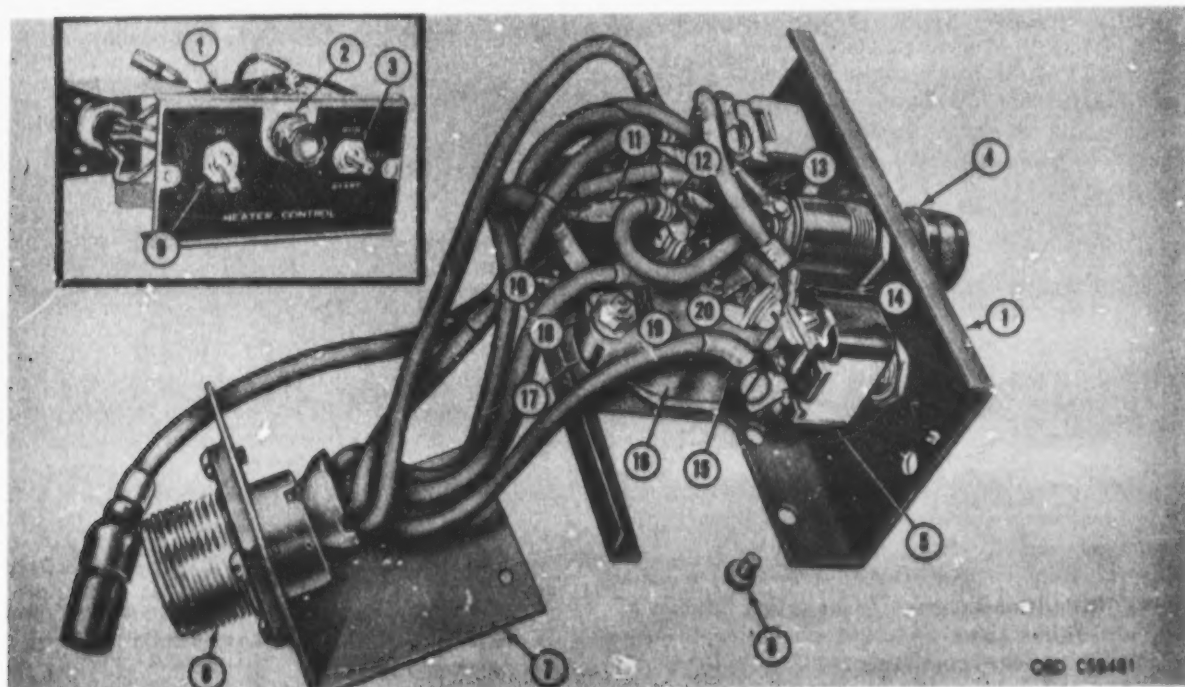
(7) Position indicator light ground lead (10)

to mounting hole of circuit breaker (16), and secure with screw and nut (18).

(8) Position receptacle mounting bracket (7) on control box panel (1), and secure with two screws (6).

(9) Install control box panel in control box (para 3-38).

(10) Start coolant heater (TM 9-1450-585-10), and check operation of indicator light.



- 1 Control box panel
- 2 Light nut and lock washer
- 3 Switch nut and lock washer
- 4 Indicator light
- 5 Hi-lo switch
- 6 Bracket screw
- 7 Receptacle mounting bracket
- 8 Receptacle
- 9 Nut and lock washer
- 10 Ground lead

- 11 Circuit 15 - 17 lead
- 12 Circuit 17 light lead
- 13 Circuit 19 light lead
- 14 Circuit 13 - 14 lead
- 15 Circuit 12 lead
- 16 Circuit breaker
- 17 Circuit breaker spacer
- 18 Screw and nut
- 19 Circuit 17 lead
- 20 Circuit 16 lead

Figure 3-30. Coolant heater hi-lo switch indicator light, and circuit breaker.

3-46. Engine Coolant Heater Hi-Lo Switch (fig. 3-30)

NOTE

Do not remove more than one component at a time from control box panel.

a. Removal.

NOTE

Make certain master switch is OFF

(1) Remove control box panel from control box (para 3-38).

(2) Remove two screws (6) securing receptacle (8) and receptacle mounting bracket (7) to control box panel (1), and straighten out leads from receptacle to control box components.

(3) Disconnect circuit 12 lead (15) from bottom terminal of hi-lo switch (5).

(4) Disconnect circuit 13 - 14 lead (14) from top terminal of hi-lo switch (5).

(5) Remove nut and lock washer (9) securing hi-lo switch (5) to control box panel (1), and remove switch from panel.

b. Inspection and Repair. Check hi-lo switch as described in electrical troubleshooting (para 3-32). Replace switch if defective.

c. Installation.

(1) Position hi-lo switch (5) on control box panel (1), and secure with nut and lock washer (9).

(2) Connect circuit 13 - 14 lead (14) to top terminal of hi-lo switch (5).

(3) Connect circuit 12 lead (15) to bottom terminal of hi-lo switch (5).

(4) Position receptacle (8) and receptacle mounting bracket (7) on control box panel (1), and secure with two screws (6).

(5) Install control box panel in control box (para 3-38).

(6) Start coolant heater (TM 9-1450-585-10), and check operation of hi-lo switch.

3-47. Engine Coolant Heater Circuit Breaker
(fig. 3-30)

NOTE

Do not remove more than one component at a time from control box panel.

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove control box panel from control box (para 3-38).

(2) Remove two bracket screws (6) securing receptacle (8) and receptacle mounting bracket (7) to control box panel (1), and straighten leads to control box panel components.

(3) Disconnect circuit 16 lead (20) from circuit breaker (16).

(4) Disconnect circuit 15 - 17 (11), circuit 17 light lead (12), and circuit 17 lead (19) from circuit breaker (16).

(5) Remove two screws and nuts (18) securing circuit breaker (16), ground lead (10), and two circuit breaker spacers (17) to control box panel (1), and remove circuit breaker and spacers.

b. Inspection and Repair. Check circuit breaker as described in electrical troubleshooting (para 3-32). Replace circuit breaker if defective.

c. Installation.

(1) Position two circuit breaker spacers (17), circuit breaker (16), and ground lead (10) on control box panel (1), and secure with two screws and nuts (18).

(2) Connect circuit 15 - 17 (11), circuit 17 light lead (12), and circuit 17 lead (19) to circuit breaker (16).

(3) Connect circuit 16 lead (20) to circuit breaker.

(4) Position receptacle (8) and receptacle mounting bracket (7) on control box panel (1), and secure with two bracket screws (6).

(5) Install control box panel in control box (para 3-38).

(6) Start coolant heater (TM 9-1450-585-10), and check operation of circuit breaker.

3-48. Engine Coolant Heater Run-Off-Start Switch

(fig. 3-31)

NOTE

Do not remove more than one component at a time from control box panel.

a. Removal.

NOTE

Make certain master switch is OFF.

(1) Remove control box panel from control box (para 3-38).

(2) Remove two screws (6, fig. 3-30) securing receptacle (3, fig. 3-31) and receptacle mounting bracket (2) to control box panel (1), and straighten out leads to control box components.

(3) Disconnect circuit 14 lead (10), circuit 13 - 14 lead (9), circuit 14 - 21 jumper (8), and circuit 18 - 21 jumper (12) from top terminals of run-off-start switch (7), and remove circuit 14 - 21 jumper.

(4) Disconnect circuit 18 - 21 jumper (12) from bottom terminal of run-off-start switch (7), and remove circuit 18 - 21 jumper.

(5) Disconnect circuit 20 lead (6) from center terminal of run-off-start switch (7).

(6) Disconnect circuit 19 lead (4) and circuit 19 light lead (5) from bottom terminal of run-off-start switch (7).

(7) Disconnect circuit 15 - 17 lead (11) from center terminal of run-off-start switch (7).

(8) Remove nut and lock washer (3, fig. 3-30) securing run-off-start switch (7, fig. 3-31) to control box panel (1), and remove switch.

b. Inspection and Repair. Check run-off-start switch as described in electrical troubleshooting (para 3-32). Replace switch if defective.

c. Installation.

(1) Position run-off-start switch (7) on control box panel (1), and secure with nut and lock washer (3, fig. 3-30).

(2) Connect circuit 15 - 17 lead (11, fig. 3-31) to center terminal of run-off-start switch (7).

(3) Connect circuit 19 lead (4) and circuit 19 light lead (5) to bottom terminal of run-off-start switch (7).

(4) Connect circuit 20 lead (6) to center terminal of run-off-start switch (7).

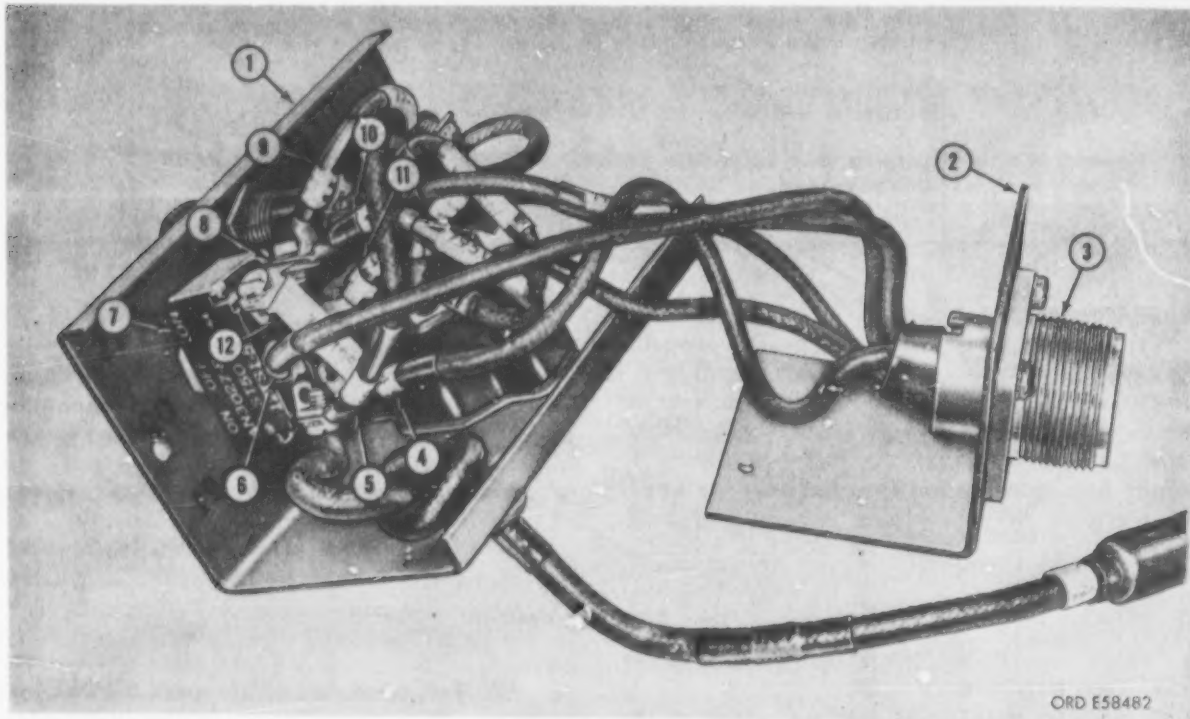
(5) Position circuit 18 - 21 jumper (12) on top and bottom terminals of run-off-start switch (7), and connect jumper to bottom terminal.

(6) Connect circuit 14 lead (10), circuit 13 - 14 lead (9), circuit 14 - 21 jumper (8), and circuit 18 - 21 jumper (12) to top terminals of run-off-start switch (7).

(7) Position receptacle (3) and receptacle mounting bracket (2) on control box panel (1), and secure with two screws (6, fig. 3-30).

(8) Install control box panel in control box (para 3-38).

(9) Start coolant heater (TM 9-1450-585-10), and check operation of run-off-start switch.



- 1 Control box panel
- 2 Receptacle mounting bracket
- 3 Receptacle
- 4 Circuit 19 lead
- 5 Circuit 19 light lead
- 6 Circuit 20 lead

- 7 Run-off-start switch
- 8 Circuit 14 - 21 jumper
- 9 Circuit 13 - 14 lead
- 10 Circuit 14 lead
- 11 Circuit 15 - 17 lead
- 12 Circuit 18 - 21 jumper

Figure 3-31. Coolant heater run-off-start switch.

Section III. TURN SIGNAL KIT

3-49. General

This section contains description, data, and instructions for service upon receipt of materiel, preventive-maintenance, troubleshooting, electrical troubleshooting, and installation of the turn signal kit; and instructions for removal, inspection, repair, and installation of components of the kit described in paragraph 3-50.

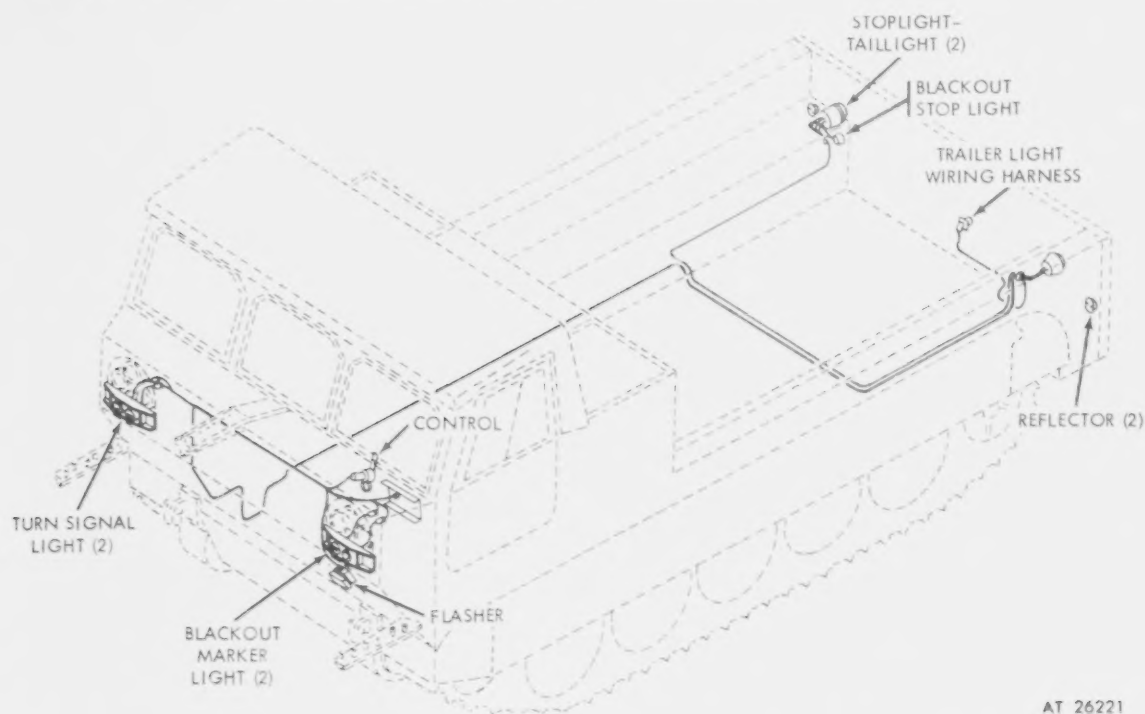
3-50. Description

(fig. 3-32)

The turn signal kit provides directional turn signals and hazard warning lights on the carrier to comply with regulations for highway operation. The kit adds turn signal lights on front of the carrier, replaces the right stop light-taillight with a vehicular stop light-taillight, adds a control and flasher in the cab, and adds the necessary wiring harness and leads to connect the control, flasher, and lights to the carrier lighting system. In addition, a blackout stop light-taillight is added on the

right rear of the carrier, reflectors are added on the rear of the carrier, and the trailer light wiring

harness is replaced to provide turn signals on any towed load.



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Figure 3-32. Turn signal kit.

3-51. Tabulated Data

Refer to TM 9-1450-585-20P for a list of kit components.

3-52. Service Upon Receipt of Materiel

a. General. Inspect the materiel to be sure it is in condition for use. Clean and prepare materiel for service. Make a record of any missing or damaged parts and of any malfunctions. Correct deficiencies. Report serious deficiencies which appear to involve unsatisfactory design or material on DA Form 2407.

b. Specific Procedures.

(1) Inspect all parts to be sure they are properly assembled and secured.

(2) Test operation of kit (para 3-57 *n*), and perform the quarterly preventive-maintenance maintenance checks and services (para 3-54).

3-53. Lubrication

The turn signal kit requires no lubrication.

3-54. Preventive-Maintenance

Refer to table 3-13 for preventive-maintenance checks and services for turn signal kit. These services are to be performed in addition to checks and services in table 2-2 when kit is installed on the carrier.

Table 3-13. Turn Signal Kit Preventive-Maintenance Checks and Services

Organizational		Quarterly Schedule	
Sequence No.	Item to be inspected	Procedure	Paragraph reference
1	Turn signal lamps, stop lights, and blackout stop light.	Test operation of lights with turn signal control in all three operating positions and in OFF position. Secure, repair, or replace any broken, cracked, or discolored lenses and inoperative lamps, control, flasher, or light.	TM 9-1450-585-10 and para 3-58 through 3-63.
2	Reflectors	Check for cracked, broken, or missing reflector lenses. Replace reflector if lens is cracked, broken, or missing.	Para 3-64.
3	Electrical wiring	Tighten electrical connections and mounting bracket screws. Tape frayed harness, and replace missing or defective connectors.	Para 3-58 through 3-63 and para 3-65.

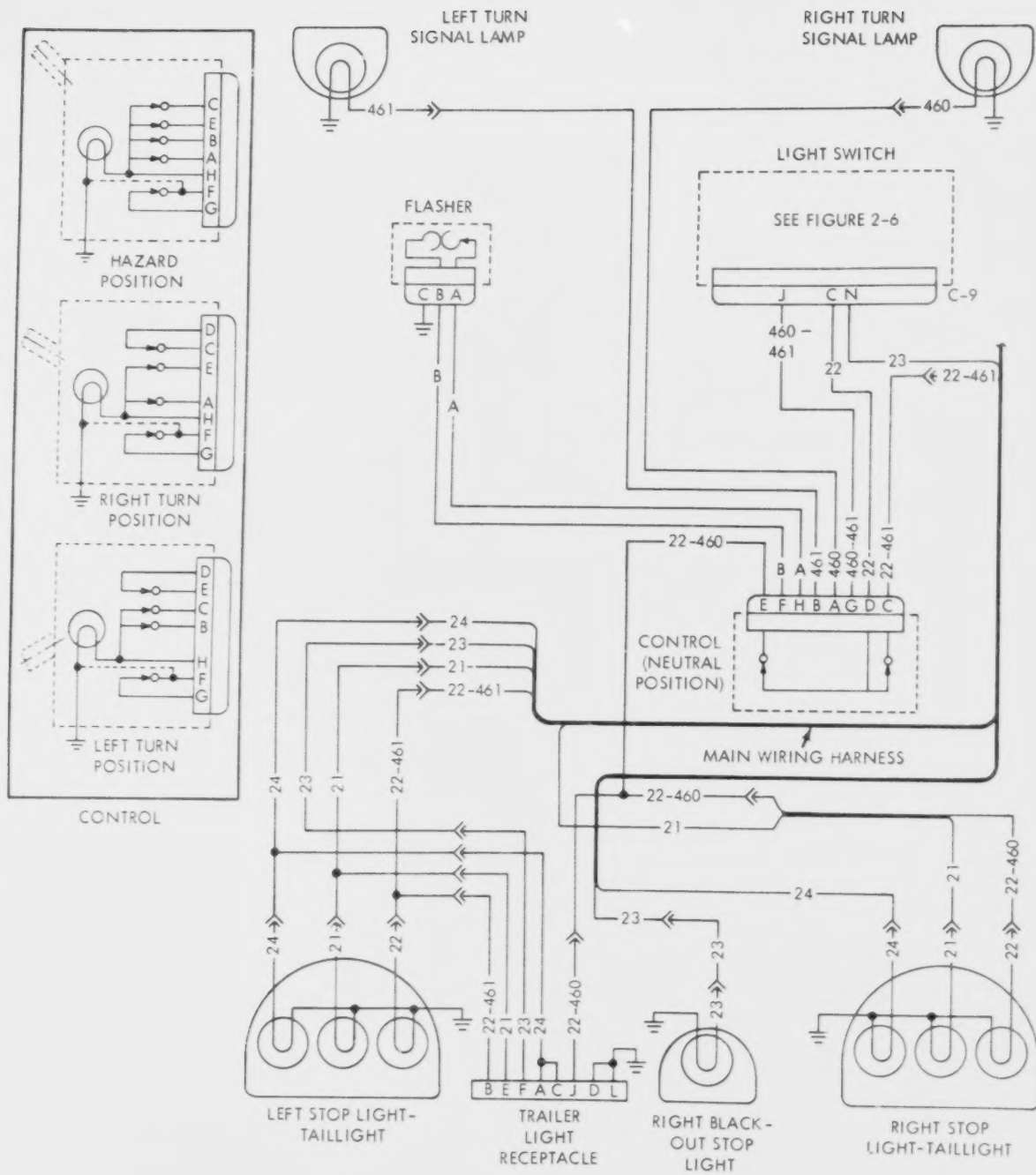
3-55. Troubleshooting

Refer to table 3-14 for troubleshooting the turn signal kit. Probable causes are listed in their order of probability and should be checked in that order during troubleshooting. Refer to TM 9-1450-585-10 for operational troubleshooting, and to paragraph 3-56 for electrical troubleshooting.

3-56. Electrical Troubleshooting

a. Circuit Diagram. See figure 3-33 for a circuit diagram of the turn signal kit.

b. Circuit Numbers. Refer to table 3-15 for a list of turn signal kit electrical circuit numbers with a brief circuit-tracer description of each circuit. Electrical leads are marked with a circuit number band attached to junction or terminal end of each lead.



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Figure 3-33. Turn signal kit circuit diagram.

Table 3-14. Turn Signal Kit Troubleshooting

Malfunction	Probable Cause	Corrective Action
1. Service stop lights inoperative.	a. Loose electrical connections or defective lamp, control, stop light switch, or main light selector switch.	a. Check electrical connection on main light selector switch, stop light switch, control, and stop lighttaillights (para 3-56). If above does not remedy malfunction, troubleshoot circuit (para 3-56).
2. Blackout stop light inoperative.	b. Stop light switch out of adjustment.	b. Adjust stop light switch (para 2-129).
	a. Loose electrical connection or defective blackout lamp, stop light-taillight, infrared-blackout selector switch stop light switch, or main light selector switch.	a. Check electrical connection on blackout stop light, infrared-blackout selector switch, stop light switch, and main light selector switch (para 3-56). If above does not remedy malfunction, troubleshoot circuit (para 3-56).
3. Turn signal lamp, stop light, or control light does not light or flash when control is in right or left turn position.	b. Stop light switch out of adjustment.	b. Adjust stop light switch (para 2-129).
	Loose electrical connection or defective turn signal bulb, turn signal lamp, stop light lamp, stop light, control, flasher, or main light selector switch.	Check electrical connections on main light selector switch, control, flasher, marker lamp, and stop light (para 3-56). If above does not remedy malfunction, troubleshoot circuit (para 3-56).
4. Turn signal lamps and stop lights do not flash with control in hazard position.	Loose electrical connection or defective turn signal bulbs, turn signal lamps, stop light lamps, stop lights, control, flashers, or main light selector switch.	Check electrical connections on main light selector switch, control, flasher, marker lamps, and stop lights (para 3-56). If above does not remedy malfunction, troubleshoot circuit (para 3-56).
5. In left or right turn signal position, individual light does not flash.	Loose electrical connection or defective turn signal bulb or stop light lamp.	Check electrical connection on turn signal lamp, stop light, taillight, and control (para 3-56). If above does not remedy malfunction, troubleshoot circuit (para 3-56).

Table 3-15. Turn Signal Kit Circuit Numbers

Circuit number	Description
A	Control assembly pin "H" to flasher pin "A."
B	Flasher pin "B" to control assembly pin "F."
22	Light selector switch pin "C" to control assembly pin "D."
22-460	Control assembly pin "E" to right stop light-taillight circuit 22, and to trailer electric coupling receptacle pin "J."
22-461	Control assembly pin "G" to left stop light-taillight circuit 22, and to trailer electric coupling receptacle pin "B."
23	Light selector switch pin "N" to right blackout stop light, and to trailer electric coupling receptacle pin "F."
460	Control assembly pin "A" to right turn signal lamp.
460-461	Light selector switch pin "J" to control assembly pin "G."
461	Control assembly pin "B" to left turn signal lamp.

c. *Operational Description.* The turn signal kit consists of a control, flasher, right and left turn signal lamps, right and left stop lights, trailer electric coupling receptacle circuits, and connecting leads to connect the receptacle circuits, lights, flasher, and control to carrier lighting system through main light selector switch. The main light selector switch and stop light switch control current to the control which actuates the turn signal lamps, stop lights, and current to trailer electric coupling receptacle when the control is operated.

d. *Functional Description.*

NOTE

All conditions below are master switch ON and main light selector switch in STOP LIGHT or SER. DRIVE position.

(1) With turn signal control in neutral position and brakes applied, the condition of turn signal system is as follows:

(a) Control pin "D" is energized from main light selector switch pin "C" (energized through stop light switch).

(b) Control pin "G" is energized from main light selector switch pin "J."

(c) Control pins "A," "B," "F," and "H" are de-energized, and control pins "C" and "E" are energized through control from pin "D."

(d) Control pin "E" energizes trailer electric coupling receptacle pin "J" and right stop light. Light is on.

(e) Control pin "C" energizes trailer electric coupling receptacle pin "B" and left stop light. Light is on.

(2) With turn signal control in right turn position and brakes applied, the condition of turn signal system is as follows:

(a) Control pin "D" is energized from main light selector switch pin "C" (energized through stop light switch).

(b) Control pin "G" is energized from main light selector switch pin "J."

(c) Control pin "F" is energized from pin "G," and pin "E" is energized from pin "D."

(d) Control pin "F" energizes flasher pin "B," flasher pin "A" intermittently energizes control pin "H," and control pin "H" intermittently energizes indicator light and control pins "A" and "E." Indicator light flashes.

(e) Control pin "C" energizes trailer electric coupling receptacle pin "B" and left stop light. Stop light is on.

(f) Control pin "E" intermittently energizes trailer electric coupling receptacle pin "J" and right stop light. Stop light flashes.

(g) Control pin "A" intermittently energizes right turn signal lamp, and light flashes.

(3) With turn signal control in left turn position and brakes applied, the condition of turn signal system is as follows:

(a) Control pin "D" is energized from main light selector switch pin "C" (energized from stop light switch).

(b) Control pin "G" is energized from main light selector switch pin "J."

(c) Control pin "F" is energized from pin "G" and pin "E" is energized from pin "D."

(d) Control pin "F" energizes flasher pin "B," flasher pin "A" intermittently energizes control pin "H," and control pin "H" intermittently energizes indicator light and control pins "B" and "C." Indicator light flashes.

(e) Control pin "E" energizes trailer electric coupling receptacle pin "J" and right stop light. Stop light is on.

(f) Control pin "C" intermittently energizes trailer electric coupling receptacle pin "B" and left stop light. Stop light flashes.

(g) Control pin "B" intermittently energizes left turn signal lamp, and light flashes.

(4) With turn signal control in hazard position and brakes applied, the condition of turn signal system is as follows:

(a) Control pin "D" is energized from main light selector switch pin "C" (energized from stop light switch).

(b) Control pin "G" is energized from main light selector switch pin "J."

(c) Control pin "F" is energized from pin "G" and current from pin "D" is cut out by the control.

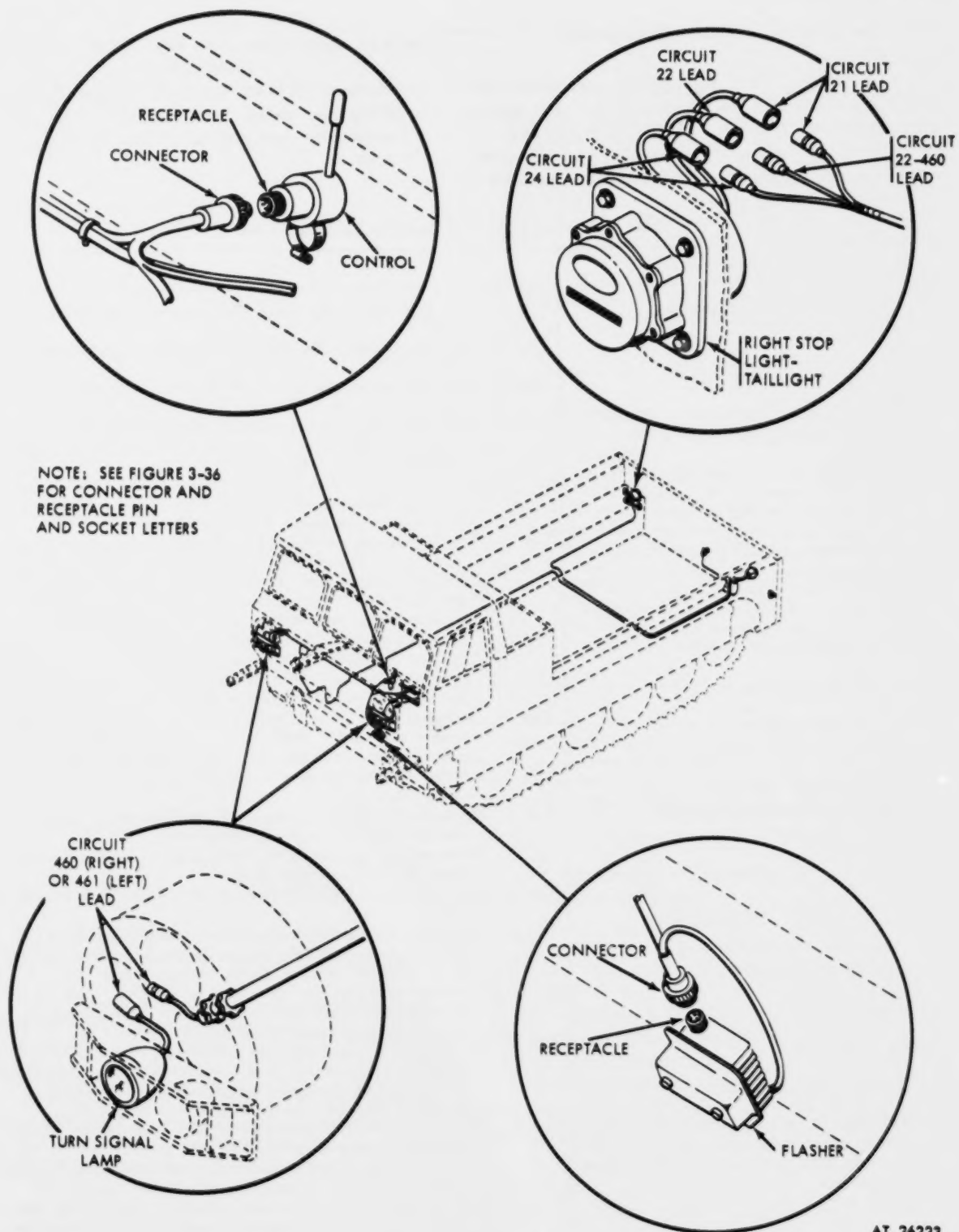
(d) Control pin "F" energizes flasher pin "B," flasher pin "A" intermittently energizes control pin "H," and control pin "H" intermittently energizes indicator light and control pins "A," "B," "C," and "E." Control indicator light flashes.

(e) Control pins "A," "B," "C," and "E" intermittently energize right and left turn signal lamps, right and left stop lights, and pins "B" and "J" of trailer electric coupling receptacle. All four lights flash, and intermittent current is supplied receptacle.

e. *Troubleshooting.*

(1) Refer to paragraph 2-18 for general information and paragraph 2-20 for test equipment for electrical troubleshooting.

(2) Refer to table 3-16 and figure 3-34 for troubleshooting the turn signal kit. Tests are given in order of probable component malfunction and should be checked in that order during troubleshooting.



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Figure 3-34. Turn signal kit electrical troubleshooting.

3-57. Installation of Turn Signal Kit**a. General.**

(1) *Scope.* This paragraph provides instructions for initial installation of the turn signal kit components listed in TM 9-1450-585-20P.

(2) *Excess parts.* Dispose of parts removed and discarded during installation of kit or excess kit

parts in accordance with AR 755-2.

NOTE

Remove XM48 Guided Missile System Launcher pallet from carrier to provide access for installation of kit in launcher area.

Table 3-16. Turn Signal Kit Electrical Troubleshooting

Turn signal malfunction	Test
1. Service stop lights inoperative	Test 1. Stop light lamps (fig. 3-34). Perform test 1, malfunction 9, table 2-7. Test 2. Stop light-taillights (fig. 3-34). Perform test 2, malfunction 9, table 2-7. Test 3. Stop light switch (fig. 2-16). Perform test 3, malfunction 9, table 2-7. Test 4. Main light selector switch (fig. 2-8). Disconnect connector C-9 from main light selector switch and place switch in STOP LIGHT or SER. DRIVE position. Check resistance from pin F through switch to pin "A" and pins "K" to "C." Both readings should be 0 ohms. If either reading is infinity, replace defective switch (para 2-128). Test 5. Turn signal control (fig. 3-34). Disconnect connector from turn signal control and place control in neutral position. Check resistance from pin "D" through control to pins "C" and "E." Both readings should be 0 ohms. Place control in right turn position; reading from "D" to "C" should be 0 ohms. Then place control in left turn position; reading from "D" to "E" should be 0 ohms. Resistance to all other pins from D should be infinity. If any other readings than those are obtained, replace defective control (para 3-62). Test 6. Harnesses (fig. 3-34). Check continuity of circuit 22-460 (right) and 22-461 (left) leads in wiring harnesses from control connector to stop lights. Both readings should be 0 ohms. If either reading is infinity, repair wiring harness (para 2-96).
2. Blackout stop light inoperative	Test 1. Blackout stop light lamp (fig. 3-33). Perform test 1, malfunction 10, table 2-7, and paragraph 3-61. Test 2. Blackout stop light (fig. 3-33). Perform test 2, malfunction 10, table 2-7 and paragraph 3-61. Test 3. Stop light switch (fig. 2-8). Perform test 3, malfunction 9, table 2-7. Test 4. Main light selector switch (fig. 2-8). Disconnect connector C-9 (fig. 2-8) from main light selector switch and place switch in B. O. DRIVE position. Check resistance from pin "F" through switch to pin "A" and from pin "K" to pin "N." Both readings should be 0 ohms. If either reading is infinity, replace defective switch (para 2-129). Test 5. Wiring harness (fig. 3-33). Check continuity of circuit 23 lead in main wiring harness from connector C-9 (fig. 2-8) pin "N" to right blackout stop light. Reading should be 0 ohms. If reading is infinity, repair wiring harness (para 2-96).
3. Turn signal lamp, stop light, or control light do not light or flash when control is in right or left turn position (all other lights operative).	Test 1. Flasher (fig. 3-34). Disconnect connector from flasher. Check resistance from pins "A" to "B," "A" to "C," and "B" to "C." Reading should indicate some (low) resistance. If any reading is infinity, replace defective flasher (para 3-63). Test 2. Control (fig. 3-34). Disconnect connector from control and place control in left or right turn position. Check resistance from pin "G" through control to pin "F." Reading should be 0 ohms. Check resistance from pin "H" to pin "B," pin "C," and control light socket (left turn) and from pin H to pin "A," pin "E," and light socket (right turn). All readings should be 0 ohms. If any reading is infinity, replace defective control (para 3-62).

Table 3-16. Turn Signal Kit Electrical Troubleshooting—Continued

Turn signal malfunction	Test
4. Turn signal lamps and stop lights do not flash with control in hazard position.	Test 3. Main light selector switch (fig. 2-8). Disconnect connector C-9 from main light selector switch and place switch in STOP LIGHT or SER. DRIVE position. Check resistance from pin F through switch to pin "J." Reading should be 0 ohms. If reading is infinity, replace defective switch (para 2-128).
	Test 1. Flasher. Perform test 1, malfunction 3, above.
	Test 2. Control (fig. 3-34). Disconnect connector from control and place control in hazard position. Check resistance from pin "G" through control to pin "F." Reading should be 0 ohms. Check resistance from pin "H" to pin "A," pin "B," pin "C," pin "E," and to control light socket. All readings should be 0 ohms. If any reading is infinity, replace defective control (para 3-62).
5. In left or right turn signal position, an individual light does not flash.	Test 3. Main light selector switch. Perform test 3, malfunction 3, above.
	Test 1. Turn signal lamp bulb (fig. 3-34). Check resistance from center contact to side of metal body. If reading is infinity, replace bulb (para 3-58).
	Test 2. Turn signal lamp (fig. 3-34). Disconnect circuit 461 (left) or 460 (right) lead from lamp. Check resistance from lamp terminal to carrier ground with bulb installed. If reading is 0 ohms or infinity, replace defective lamp (para 3-58).
	Test 3. Wiring harness (fig. 3-34). Disconnect connector from control and circuit 461 (left) or 460 (right) lead from lamp. Check resistance from 460 lead to pin "A" of connector or from 461 lead to pin "B" of connector. Reading should be 0 ohms. If reading is infinity, repair wiring harness (para 2-96).
	Test 4. Stop light lamps (fig. 3-34). Perform test 1, malfunction 9, table 2-7.
	Test 5. Stop light-taillights (fig. 3-34). Perform test 2, malfunction 9, table 2-7.
	Test 6. Wiring harness (fig. 3-34). Disconnect connector from control and circuit 22-461 (left) or 22-460 (right) lead from taillight. Check resistance from 22-461 lead to pin "C" of connector or from 22-460 lead to pin E of connector. Reading should be 0 ohms. If reading is infinity, repair wiring harness (para 2-96).

b. Prepare Right Rear of Carrier (fig. 3-35).

(1) Remove right stop light-taillight (para 2-121).

(a) Remove and retain four screws and washers securing right stop light-taillight bracket to hull.

(b) Disconnect right stop light-taillight from main wiring harness, and remove and retain two washers and shells from right stop light-taillight leads.

(c) Remove and retain two screws, two washers, and gasket securing stop light-taillight to bracket, and remove and discard stop light-taillight. Retain bracket.

(2) Locate and cut one 3 5/16 to 3-11/16 inch diameter hole in fender.

CAUTION

To prevent cutting fuel compartment vent hose, do not use cutting torch to cut hole in fender.

(3) Locate and drill eight 5/16 inch diameter holes in fender. Bracket and reflector may be used as templates to locate holes.

(4) Disconnect one end of existing vent hose, cut approximately 2 inches off end of hose, and reconnect hose.

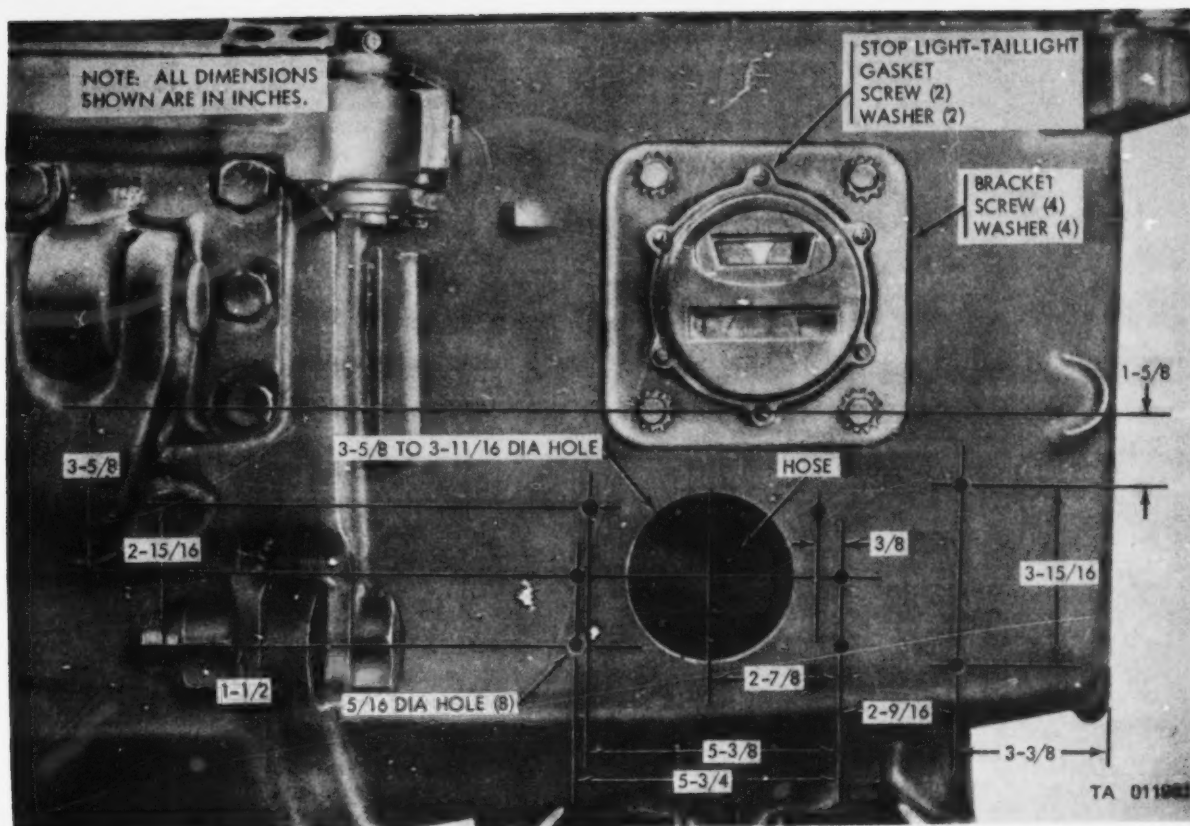


Figure 3-35. Right rear of carrier.

c. Prepare Left Rear of Carrier (fig. 3-36).

(1) Remove left stop light-taillight (para 2-120).

(a) Remove and retain four screws and washers securing left stop light-taillight bracket to hull.

(b) Disconnect left stop light-taillight from wiring harnesses, and remove and retain left stop light-taillight with bracket.

(2) Remove trailer electric coupling receptacle and cover (para 2-150).

(a) Disconnect trailer light wiring harness from wiring harnesses, and remove and retain four washers and shells from trailer light wiring harness leads.

(b) Remove and retain screw, washer, and nut securing trailer wiring harness ground lead to hull.

(c) Remove and retain two connectors and one spring from trailer light wiring harness.

(d) Remove and retain four screws and cover securing trailer light wiring harness to tailgate, and remove and discard trailer light wiring harness.

(3) Remove and retain wiring harnesses from main wiring harness.

(4) Locate and drill two 5/16 inch diameter holes in fender. Reflector may be used as template to locate holes.

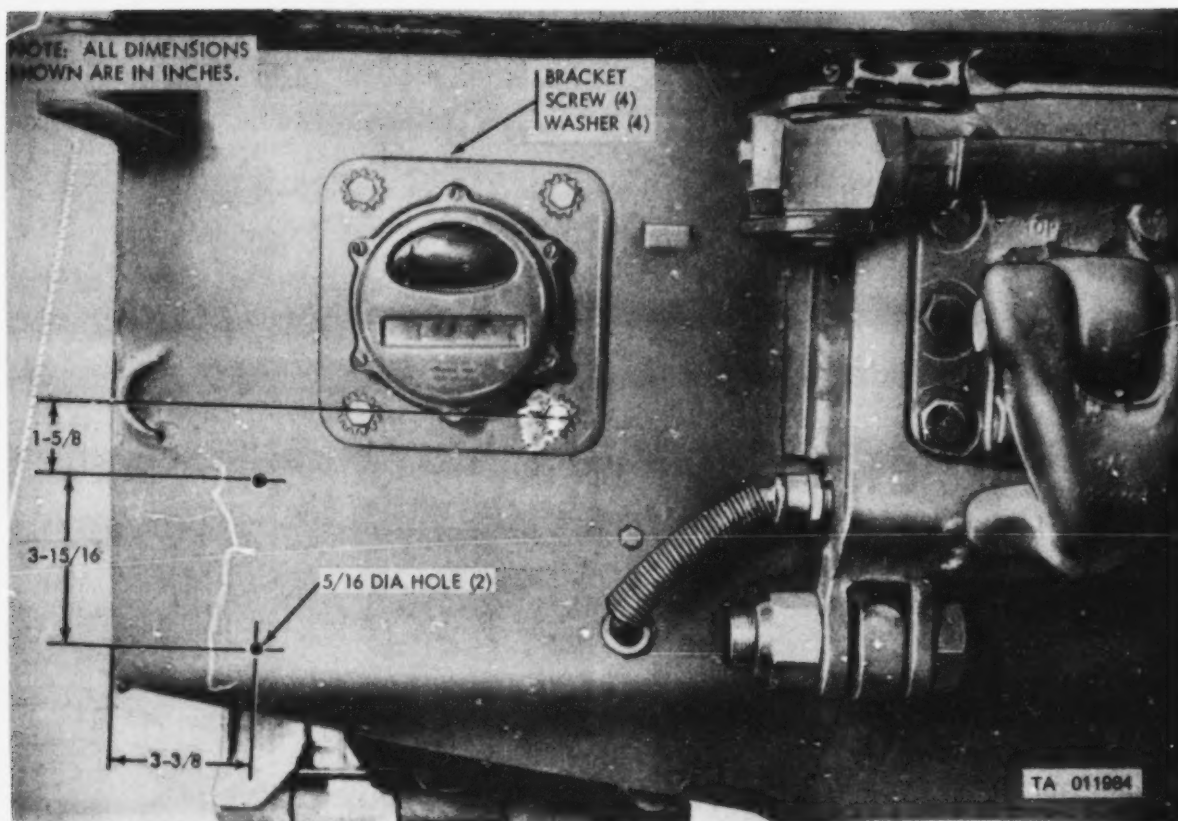


Figure 3-36. Left rear of carrier.

d. Prepare Right Front of Carrier (fig. 3-37).

(1) Remove blackout marker light (para 2-122).

(a) Disconnect circuit 20 lead from marker light.

(b) Remove and retain nut and washer securing light to hull bracket, and remove and retain light.

(2) Remove and discard marker light hull bracket.

(3) Locate and drill two $17/32$ inch diameter holes in hull. Bracket may be used as template to locate holes.

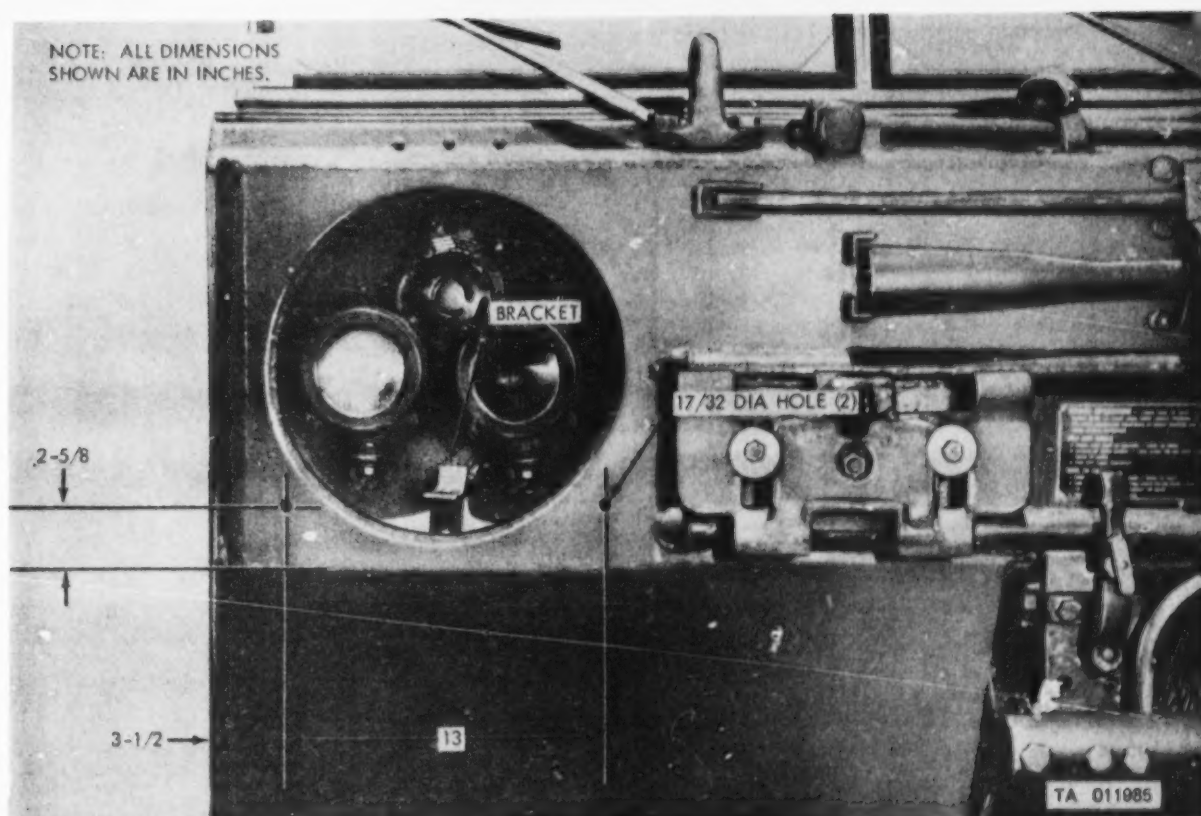


Figure 3-37. Right front of carrier.

e. Prepare Left Front of Carrier (fig. 3-38).

(1) Remove blackout marker light (para 2-122).

(a) Disconnect circuit 20 lead from marker light.

(b) Remove and retain nut and washer securing light to hull bracket, and remove and retain light.

(2) Remove and discard marker light hull bracket.

(3) Locate and drill two 17 / 32 inch diameter holes in hull. Bracket may be used as template to locate holes.

(4) Locate and drill two 7 / 16 inch diameter holes in hull.

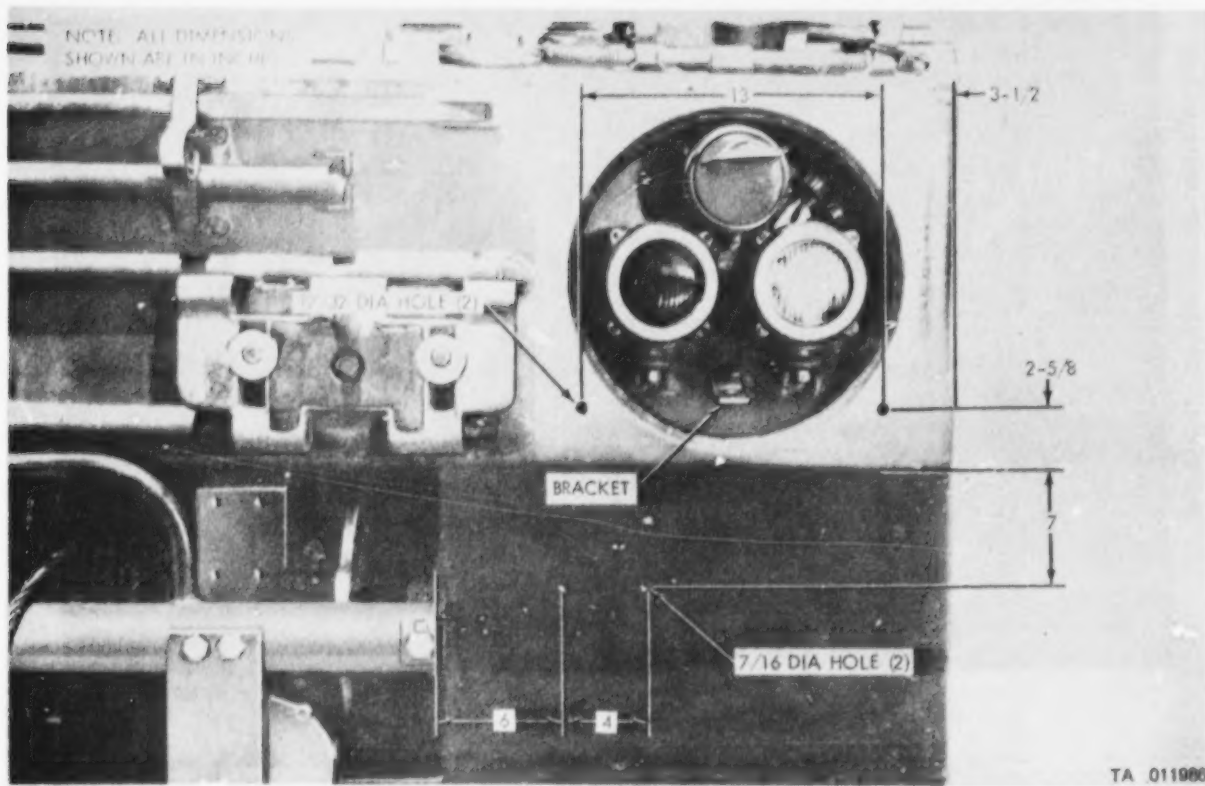


Figure 3-38. Left front of carrier.

f. Prepare Cab (fig. 3-39).

(1) Locate and drill three 5/16 inch diameter holes in transmission range selector hull mount. Bracket may be used as template to locate holes.

(2) Partially remove instrument panel (para 2-92).

NOTE

Do not disconnect any electrical leads.

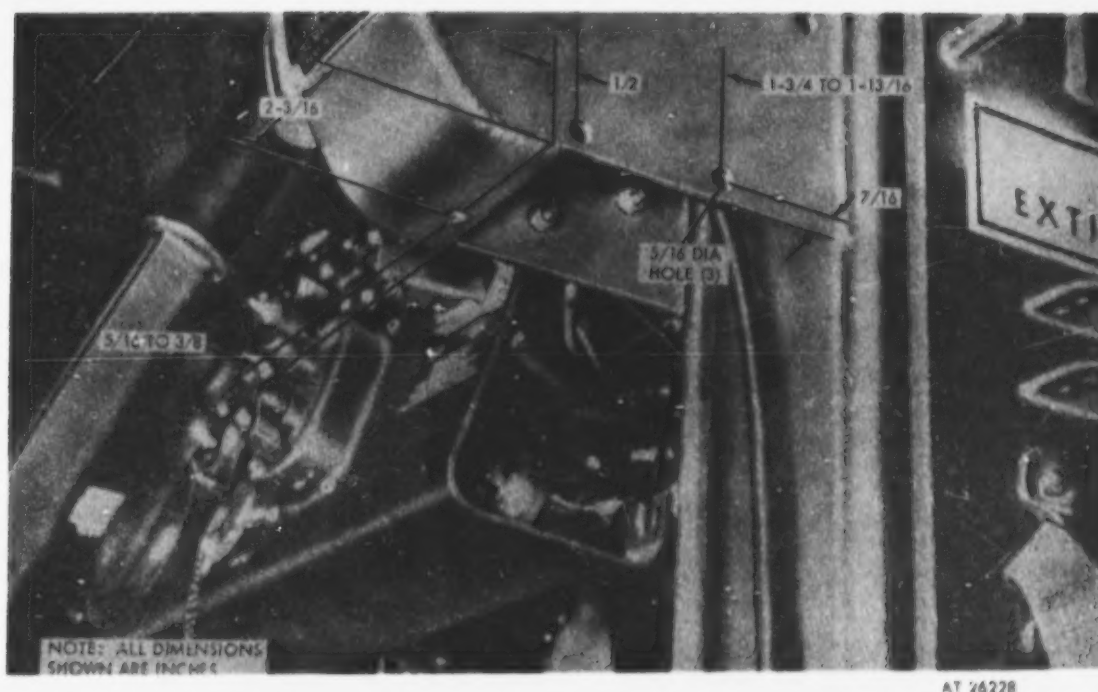
g. Inspection Before Installation of Kit Components. Before drilling mounting holes, check

layouts to insure that centerlines are within 1/16 inch tolerance of dimensions specified on illustrations or use brackets as templates after locating hole pattern.

h. Installation of Kit Components in Cab.

(1) *Flasher* (para 3-63). Use gasket, bar, two washers, two screws, two washers, and two screws to install flasher.

(2) *Control assembly* (para 3-62). Use bracket, six washers, three screws, and three nuts to install control assembly.



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Figure 3-39. Cab.

(3) Wiring harness (fig. 3-40).

NOTE

See figure 3-33 for turn signal kit electrical circuit diagram for electrical connection during installation of wiring harness.

(a) Connect wiring harness to flasher with one additional washer (para 3-63) and to control assembly (para 3-62). Secure flasher harness lead to fuel cutoff control cable with two straps.

(b) Disconnect connector (28, fig. 3-40) from light selector switch (20) on back of instrument panel (19).

(c) Separate connector (28), unsolder main wiring harness existing circuit 22 lead from pin C in connector (28), and pull lead from bushing.

(d) Install marker (26) on main wiring harness (8) existing circuit 22 lead to make circuit 22-461 lead (27), and install shell (25), washer (24), and terminal (23) on lead (27).

(e) Connect front wiring harness (10) circuit 22-461 lead (27) to new main wiring harness circuit 22-461 lead.

(f) Thread front wiring harness (10) circuit 22 lead (21) through connector (28), and solder

lead to pin C of connector with solder SN50 or SN60.

(g) Thread front wiring harness (10) circuit 460-461 lead (22) through connector (28), and solder lead to pin J of connector with solder SN50 or SN60.

(h) Assembly connector (28), and connect to light selector switch (20).

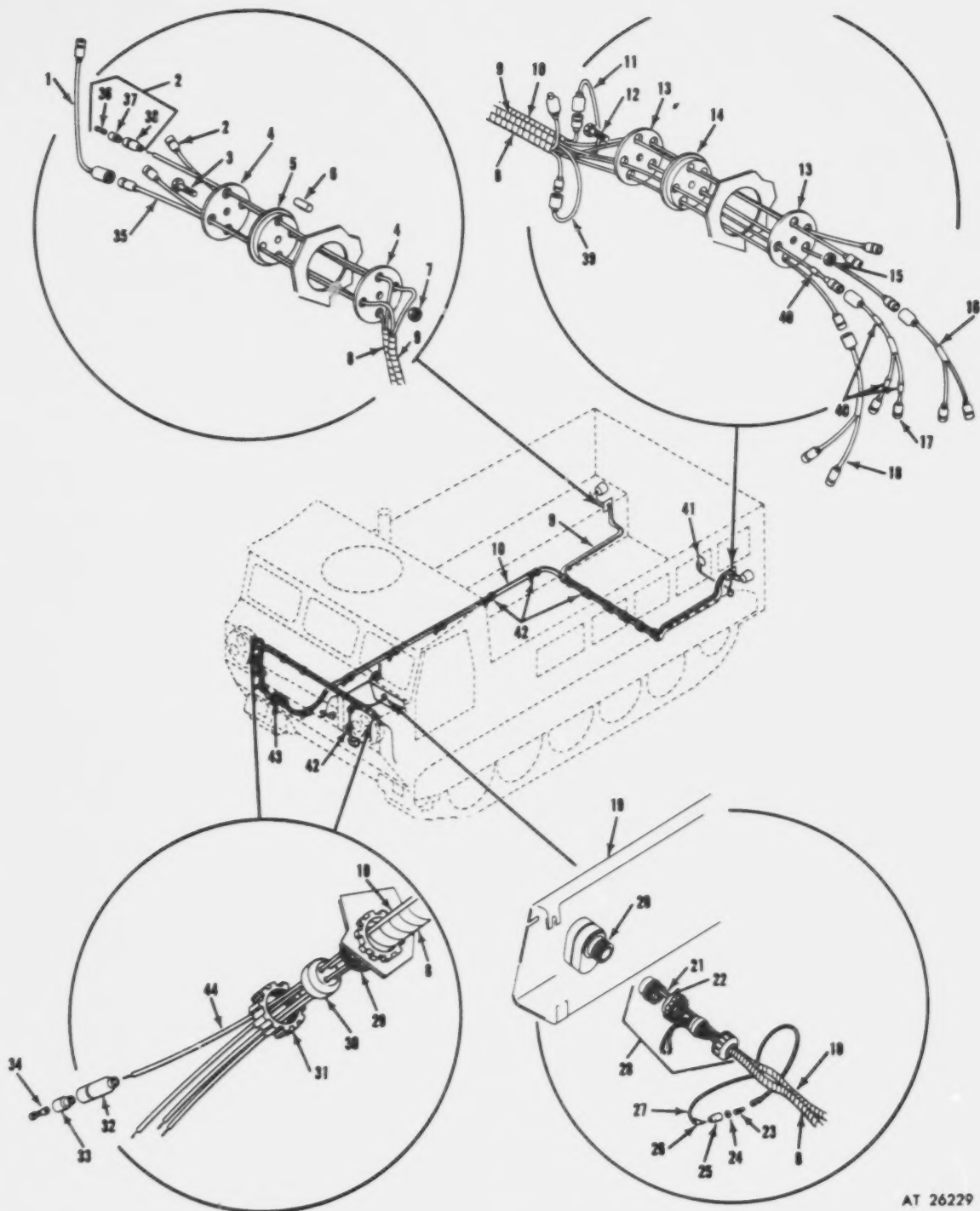
(i) Route circuit 461 lead of front wiring harness (10) along main wiring harness (8) to left headlight well.

(j) Route circuit 460 lead of front wiring harness (10) along main wiring harness (8) to right headlight well.

(k) Route circuit 22-460 lead of front wiring harness (10) along rear main wiring, through grommet (43) in cab floor and rear power plant compartment bulkhead, along right side of carrier, and across front of fuel compartment.

(l) Secure front wiring harness (10) to main wiring harness (8) across front of carrier and back to fuel compartment with straps (42) adjacent to each existing harness clamp, where accessible.

(m) Install instrument panel (para 2-92).



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Figure 3-10. Turn signal kit wiring harnesses and routing.

LEGEND to fig. 3-40

- 1 Connecting cable
- 2 Connector
- 3 Screw
- 4 Retainer
- 5 Bushing
- 6 Rod
- 7 Nut
- 8 Main wiring harness
- 9 Rear wiring harness
- 10 Front wiring harness
- 11 Circuit 22-460 lead
- 12 Screw
- 13 Retainer
- 14 Bushing
- 15 Nut
- 16 Right taillight wiring harness
- 17 Trailer receptacle wiring harness
- 18 Left taillight wiring harness
- 19 Instrument panel
- 20 Light selector switch
- 21 Circuit 22 lead
- 22 Circuit 460-461 lead
- 23 Terminal
- 24 Washer
- 25 Shell
- 26 Marker
- 27 Circuit 22-461 lead
- 28 Connector
- 29 Stuffing tube
- 30 Gasket
- 31 Nut
- 32 Shell
- 33 Sleeve
- 34 Terminal
- 35 Circuit 23 lead
- 36 Terminal
- 37 Sleeve
- 38 Shell
- 39 Circuit 21 lead
- 40 Marker
- 41 Wiring harness
- 42 Strap
- 43 Grommet
- 44 Circuit 460 or 461 lead

i. Installation of Kit Components on Left Front of Carrier.

(1) *Wiring harness* (fig. 3-40).

(a) Disconnect leads from left infrared headlight.

(b) Unscrew nut (31) from stuffing tube (29), and slide existing gasket (30) down on leads.

(c) Thread circuit 461 lead (44) of front wiring harness (10) through stuffing tube (29) and through one hole on new gasket (30).

(d) Install shell (32), sleeve (33), and terminal (34) on end of circuit 461 lead (44), and slide sleeve and shell over terminal.

(e) One at a time, remove terminals (34), sleeves (33), shells (32), and marker bands from ends of circuit 20, 514 and 515 leads of main wiring harness (8), pull leads from existing gasket (30), thread leads through new gasket (30), and

reinstall shells (32), sleeves (33), and marker bands on leads. Discard three terminals (34) and one gasket (30).

(f) Install three terminals (34) on ends of circuit 20, 514, and 515 leads, and slide sleeves (33) and shells (32) over terminals.

(g) Slide gasket (30) into stuffing tube (29), and install nut (31).

(h) Connect circuit 514 and 515 leads to infrared headlight.

(2) *Marker light and turn signal lamp.*

(a) Install retained marker light on bracket with one new washer, one retained washer, and retained nut (para 3-59).

(b) Install turn signal lamp on bracket with stud, two washers, and nut (para 3-58).

(c) Apply caulking compound MIL-C-18969, Type I, around bracket mounting holes, position bracket on hull, and secure with two screws, four washers, and two nuts.

(d) Connect marker light to circuit 20 lead and turn signal lamp to circuit 460 lead.

NOTE

If circuit 20 lead cannot be connected to relocated marker light, install cable assembly to extend circuit 20 lead.

j. Installation of Kit Components on Right Front of Carrier.

(1) *Wiring harness* (fig. 3-40).

(a) Disconnect leads from service drive headlight.

(b) Unscrew nut (31) from stuffing tube (29), and slide existing gasket (30) down on leads.

(c) Thread circuit 460 lead (44) of front wiring harness (10) through stuffing tube (29) and through one hole of new gasket (30).

(d) Install shell (32), sleeve (33), and terminal (34) on end of circuit 460 lead (44), and slide sleeve and shell over terminal.

(e) One at a time, remove terminals (34), sleeves (33), shells (32), and marker bands from ends of circuit 17, 18, and 20 leads of main wiring harness (8), pull leads from existing gasket (30), thread leads through new gasket (30), and reinstall shells (32), sleeves (33), and marker bands on leads. Discard three terminals (34) and one gasket (30).

(f) Install three terminals (34) on ends of circuit 17, 18, and 20 leads, and slide sleeves (33) and shells (32) over terminals.

(g) Slide gasket (30) into stuffing tube (29), and install nut (31).

(h) Connect circuit 17 and 18 leads to service drive headlight.

(2) *Marker light and turn signal lamp.*

(a) Install retained marker light on bracket

with washer, retained washer, and retained nut (para 3-59).

(b) Install turn signal lamp on bracket with stud, two washers, and nut (para 3-58).

(c) Apply caulking compound MIL-C-18969, Type I, around bracket mounting holes, position bracket on hull, and secure with two screws, four washers, and two nuts.

(d) Connect marker light to circuit 20 lead and turn signal lamp to circuit 460 lead.

NOTE

If circuit 20 lead cannot be connected to relocated marker light, install cable assembly to extend circuit 20 lead.

k. Installation of Kit Components on Left Rear of Carrier.

(1) *Trailer electric coupling receptacle and cover* (para 2-150).

(a) Thread trailer light wiring harness (41, fig. 3-40) through railgate, and secure with retained cover and four screws.

(b) Install two retained connectors and one retained spring on wiring harness, open tailgate to insure sufficient harness length, and secure connectors in tailgate and hull.

(c) Position wiring harness ground lead on hull, and secure with retained screw, washer, and nut.

(d) Install five shells and washers on end of harness (four shells and washers retained (c)(2) above) and one new shell and washer supplied with kit).

(2) *Wiring harnesses* (fig. 3-40)

(a) Thread circuit 22-460 leads of front wiring harness (10) through channel on left side of carrier along main wiring (8) to left rear corner of carrier. Thread two lead ends (without connectors) of rear wiring harness (9) from left rear of carrier through channel along main wiring harness (8) to left front of fuel compartment.

(b) Connect circuit 22-460 lead (11) (short) of harness (10) to circuit 22-460 lead of rear wiring harness (9).

(c) Remove and retain screw (12) and nut (15) securing two retainers (13) and one bushing (14) in hull, and remove and discard two retainers and one bushing.

(d) Connect existing circuit 21 lead of main wiring harness (8) to circuit 21 lead (39) of rear wiring harness (9).

(e) Install marker (40) on existing circuit 22 lead of main wiring harness (8) to indicate circuit 22-461 lead.

(f) Thread circuit 22-461, 23, and 24 leads of main wiring harness (8), circuit 22-460 lead of

front wiring harness (10), and circuit 21 lead of rear wiring harness (9) through two retainers (13) and bushing (14).

(g) Position bushing (14) and two retainers (13) in hull, and secure with retained screw (12) and nut (15).

(h) Install three markers (40) on retained trailer receptacle wiring harness (17) to indicate circuit 22-461 leads, and connect harness to circuit 22-461 lead of main wiring harness (8).

(i) Connect retained right taillight wiring harness (16) to circuit 21 lead of rear wiring harness (9), and connect retained left taillight wiring harness (18) to circuit 24 leads of main wiring harness (8).

(j) Connect lead of trailer light wiring harness (41) to corresponding leads on wiring harnesses.

(3) *Reflector and stop light-taillight.*

(a) Install reflector using two screws and nuts (para 3-64).

(b) Install stop light-taillight using four retained washers and screws (para 2-120).

l. Installation of Kit Components on Right Rear of Carrier.

(1) *Rear wiring harness* (fig. 3-40).

(a) Route rear wiring harness (9) along main wiring harness (8) and front wiring harness (10) across front of fuel compartment, and thread end of harness through channel on right side of carrier with main wiring harness (8).

(b) Secure wiring harnesses (9 and 10) to main wiring harness (8) with straps (42) adjacent to each existing harness clamp.

(c) Remove screw (3) and nut (7) securing two retainers (4) and one bushing (5) in hull, and remove and discard two rods (6) from bushing (5).

(d) Thread circuit 22-460 and 21 leads of rear wiring harness (9) through bushing (5), position bushing and two retainers (4) on hull, and secure with screw (3) and nut (7).

(e) Install shell (38), sleeve (37), and terminal (36) of two connectors (2) on leads of rear wiring harness (9).

(f) Connect cable (1) to main wiring harness circuit 23 lead (35).

(2) *Reflector and lights.*

(a) Install reflector using two screws and nuts (para 3-64).

(b) Install blackout stop light MS51302-1 using bracket, two washers, stud, nut, six screws, two washers, and six nuts (para 3-61).

(c) Install stop light-taillight using retained gasket, bracket, two washers, two screws, two shells, two washers, four washers, four screws, and one new shell and washer (para 3-60).

m. Inspection After Installation of Kit Components. Inspect brackets, lights, control, and flasher for secure mounting. Make certain all lock washers are installed under screw heads and nuts or between brackets for proper grounding of parts.

n. Test. Test operation of lights as follows:

NOTE

Make certain master switch is ON.

(1) Position main light selector switch in STOP or SER. DRIVE position.

(2) Move lever on control assembly to left, and check left front turn signal light and left rear stop light-taillight. The light on the control lever, the left front turn signal light, and the left stop light-taillight should flash intermittently. There should also be 24 volts intermittently at pin B of the trailer light receptacle. If brakes are applied, right stop light and taillight should be ON, and there should be 24 volts at pin J trailer light receptacle.

(3) Move lever on control assembly to right, and check right front turn signal light and right rear stop light-taillight. The light on the control lever, the right front turn signal light, and the right stop light-taillight should flash intermittently. There should also be 24 volts intermittently at pin J of the trailer light receptacle. If brakes are applied, left stop light-taillight should be ON, and there should be 24 volts at pin B of trailer light receptacle.

(4) Lift stop on lever on control assembly, and move lever to extreme right. The light on the control lever, both front turn signal lights, and both rear stop light-taillights should flash intermittently. There should also be 24 volts intermittently at pins B and J of the trailer light wiring harness receptacle.

(5) Position main light selector switch in B. O. DRIVE position and the infrared-blackout selector switch in B.O. position. The front blackout marker

lights, blackout headlight, and the blackout marker lights in the taillights should come on; in addition, the new right blackout stop light should come on when both differential steering levers are pulled to brake the carrier.

o. Paint. Clean and paint all exposed unpainted metal surfaces as required after final inspection and test in accordance with TM 9-213.

3-58. Turn Signal Lamp Assembly

a. Removal of Lamp (fig. 3-41).

(1) Remove two screws and washers securing door, lens, and gasket to body, and remove door, lens, and gasket. Discard gasket.

(2) Remove lamp from socket in body.

b. Removal of Lamp Assembly (fig. 3-42).

(1) Disconnect circuit 460 (right side) or 461 (left side) lead from lamp.

(2) Remove nut, two lock washers, and stud securing lamp to bracket, and remove lamp.

c. Inspection and Repair.

(1) Inspect for cracked or broken lens and door. Replace cracked or broken lens or door.

(2) Check lamp and lamp assembly as described in electrical troubleshooting (para 3-56). Replace defective lamp or lamp assembly.

d. Installation of Lamp Assembly (fig. 3-42).

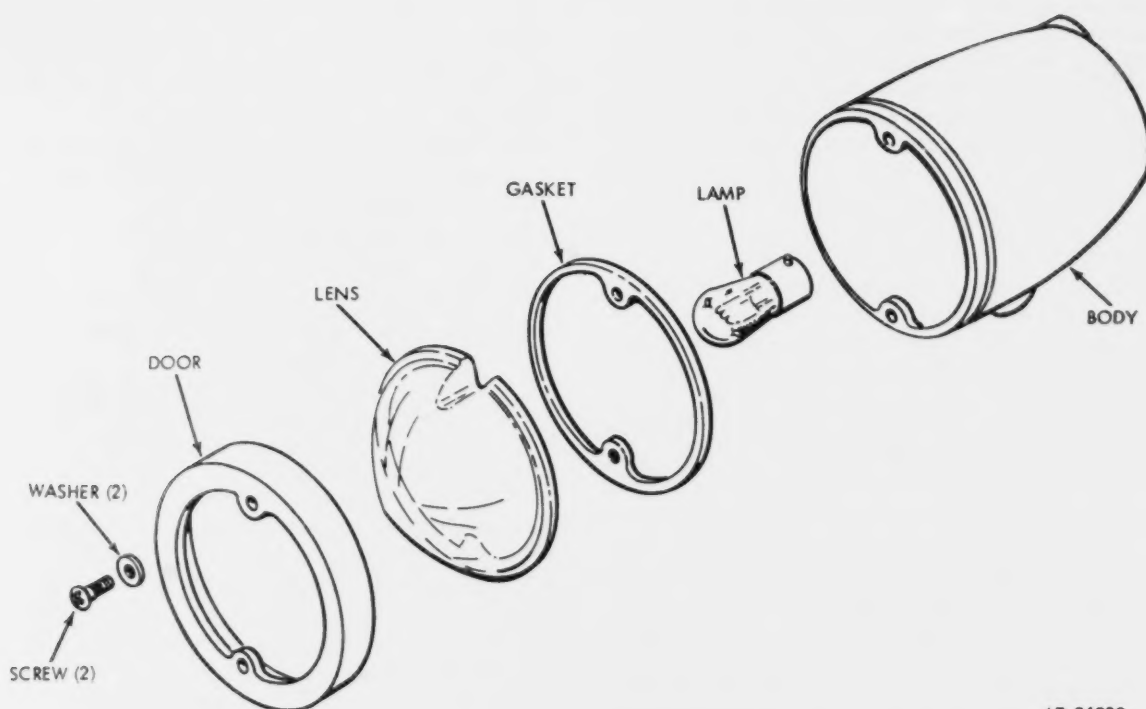
(1) Position lamp on bracket, and secure with stud, two new lock washers, and nut. Install one washer on each side of bracket, and make certain 1½ threads extend through nut after installation.

(2) Connect circuit 460 (right side) or 461 (left side) lead to lamp assembly.

e. Installation of Lamp (fig. 3-41).

(1) Install lamp in socket in body.

(2) Position new gaskets, lens, and door on body, and secure with two washers and screws.



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Figure 3-41. Turn signal lamp assembly—partial exploded view.

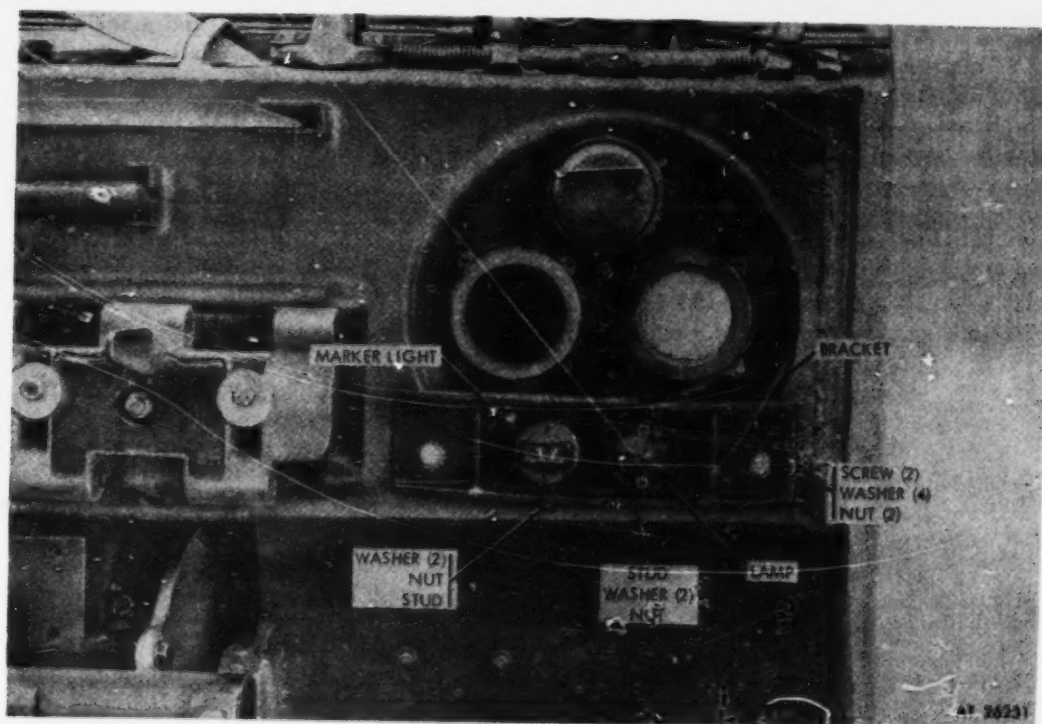


Figure 3-42. Turn signal lamp and marker light—left side shown.

3-59. Blackout Marker Light

a. Removal of Lamp. Refer to paragraph 2-122 *b*.

b. Removal of Light (fig. 3-42).

(1) Disconnect circuit 20 lead from marker light.

(2) Remove nut, two washers, and stud securing light to bracket, and remove light. Discard washers.

c. Inspection and Repair.

(1) Inspect for cracked or broken lens and door. Replace cracked or broken lens or door.

(2) Check light and lamp as described in electrical troubleshooting (para 2-23). Replace defective lamp or light.

d. Installation of Light (fig. 3-42).

(1) Position light on bracket, and secure with stud, two new lock washers, and nut. Install one washer on each side of bracket, and make certain $1\frac{1}{2}$ threads extend through nut after installation.

(2) Connect circuit 20 lead to marker light.

e. Installation of Lamp. Refer to paragraph 2-122 *d*.

3-60. Right Stop Light-Taillight

(fig. 3-44)

NOTE

When the turn signal kit is installed, both the right and left stop light-taillights are identical.

Refer to paragraph 2-120 for maintenance of the taillight and see figure 3-32 for electrical connections.

3-61. Blackout Stop Light

a. Removal and Installation of Lamp. Refer to

paragraph 2-122. Removal and installation of the blackout stop light lamp is similar to the blackout marker light.

b. Removal of Light (fig. 3-43)

(1) Remove right stop light-taillight (para 2-121 and 3-60).

(2) Disconnect circuit 23 lead from light.

(3) Remove six nuts, two lock washers, and six screws securing bracket to hull, and partially remove bracket with light. Discard washers.

(4) Remove nut, two lock washers, and stud securing light to bracket, and remove light and bracket. Discard washers.

c. Inspection and Repair.

(1) Inspect for cracked and bent bracket. Repair cracked bracket. Replace bracket damaged beyond repair.

(2) Check lamp and socket as described in electrical troubleshooting for blackout marker light (para 2-23). Replace defective parts.

d. Installation of Light (fig. 3-43).

(1) Position bracket in hull opening, insert blackout stop light in bracket, and secure with two new lock washers, stud, and nut. Install one washer on each side of bracket, and make certain $1\frac{1}{2}$ threads extend through nut after installation.

(2) Position bracket in hull opening, and secure with six screws, two new lock washers, and six nuts.

(3) Position fuel compartment vent hose over bracket, and connect circuit 23 lead to blackout stop light.

(4) Install right stop light-taillight (para 2-121 and 3-60).

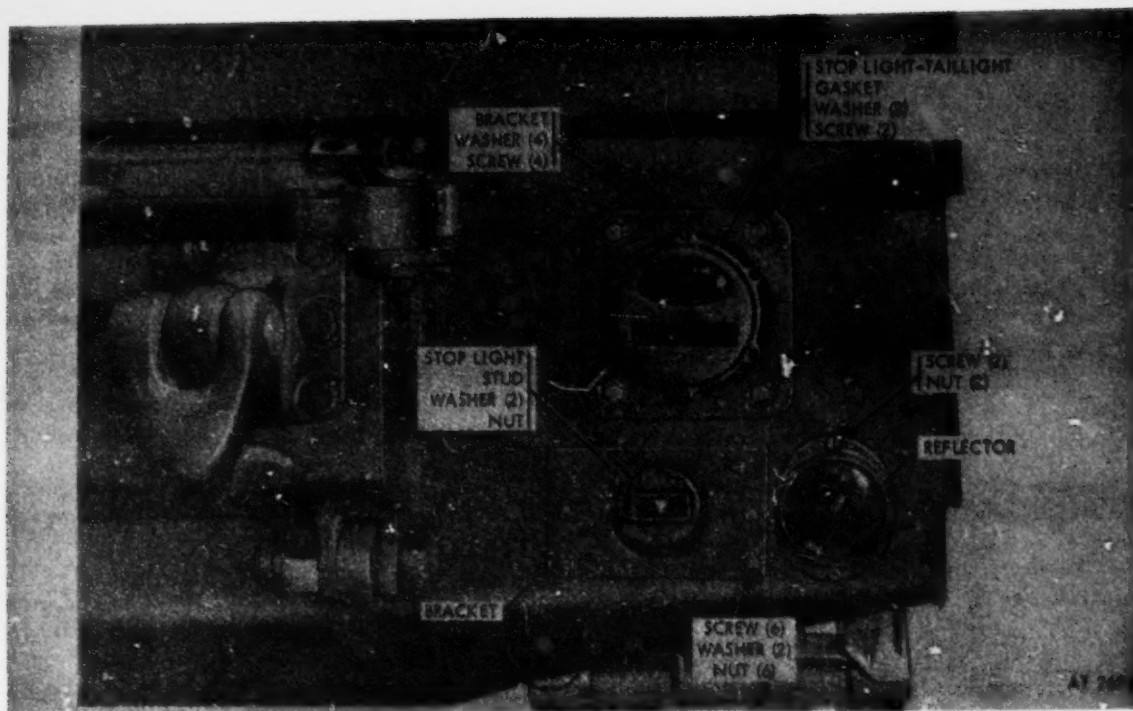


Figure 3-43. Right stop light and blackout stop light—saillights.

3-62. Control Assembly (fig. 3-44)

a. Removal of Lamp. Unscrew shield, and remove lamp from socket.

b. Removal of Control.

(1) Disconnect harness from control.

(2) Loosen clamp securing control to bracket, and remove control.

(3) If required, remove three nuts, six washers, and three screws securing bracket to control mount, and remove bracket.

c. Inspection and Repair.

(1) Inspect bracket for cracks. Repair cracks. Replace bracket damaged beyond repair.

(2) Check lamp, socket, and control as described in electrical troubleshooting (para 3-56). Replace defective parts.

d. Installation of Control.

(1) If bracket was removed, position bracket on control mount, and secure with three screws, six washers, and three nuts.

(2) Position control on bracket, and tighten clamp.

(3) Connect harness to control, and check operation of control (TM 9-1450-585-10).

e. Installation of Lamp. Install lamp in socket, and screw on shield.

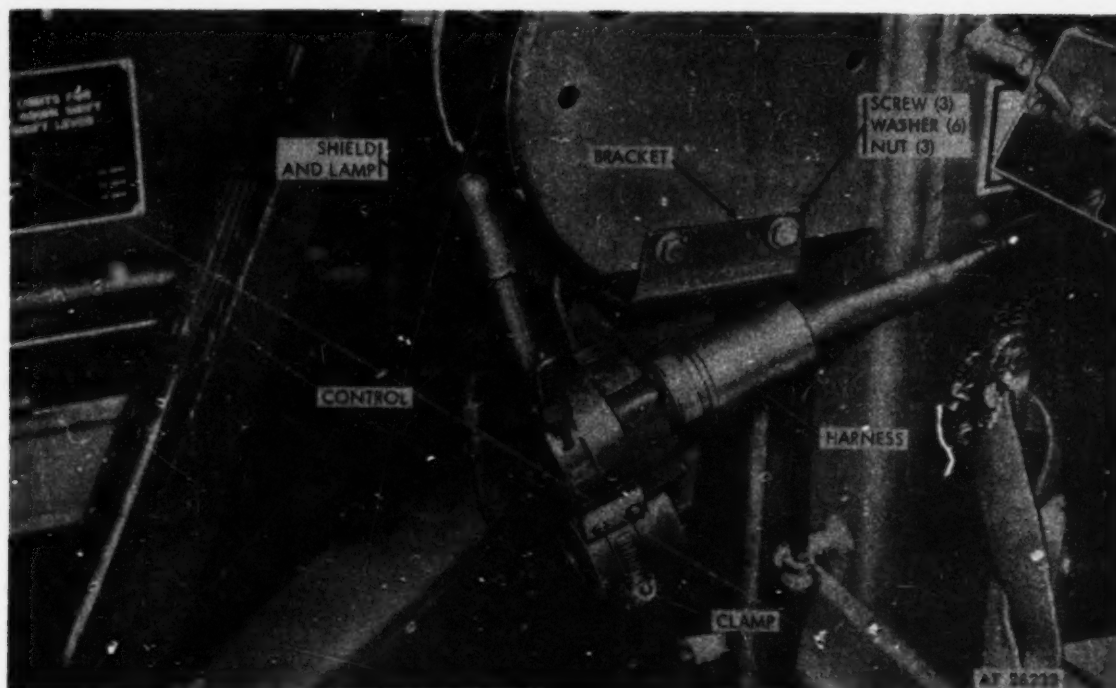


Figure 3-44. Control assembly.

3-63. Flasher

(fig. 3-45)

a. Removal.

- (1) Disconnect harness from flasher.
- (2) Remove two screws and three lock washers securing flasher to bar, and remove flasher. Discard washers.

- (3) If required, remove two screws and washers and securing bar to hull from outside of carrier, and remove bar and gasket. Discard gasket.

b. Inspection and Repair. Check flasher as

described in electrical troubleshooting (para 3-56). Replace defective flasher.

c. Installation.

- (1) If bar was removed, position new gasket and bar on hull, and secure with two washers and screws from outside carrier.

- (2) Position flasher and harness ground lead on bar, and secure with three new lock washers and two screws. Install one washer on each side of harness ground lead.

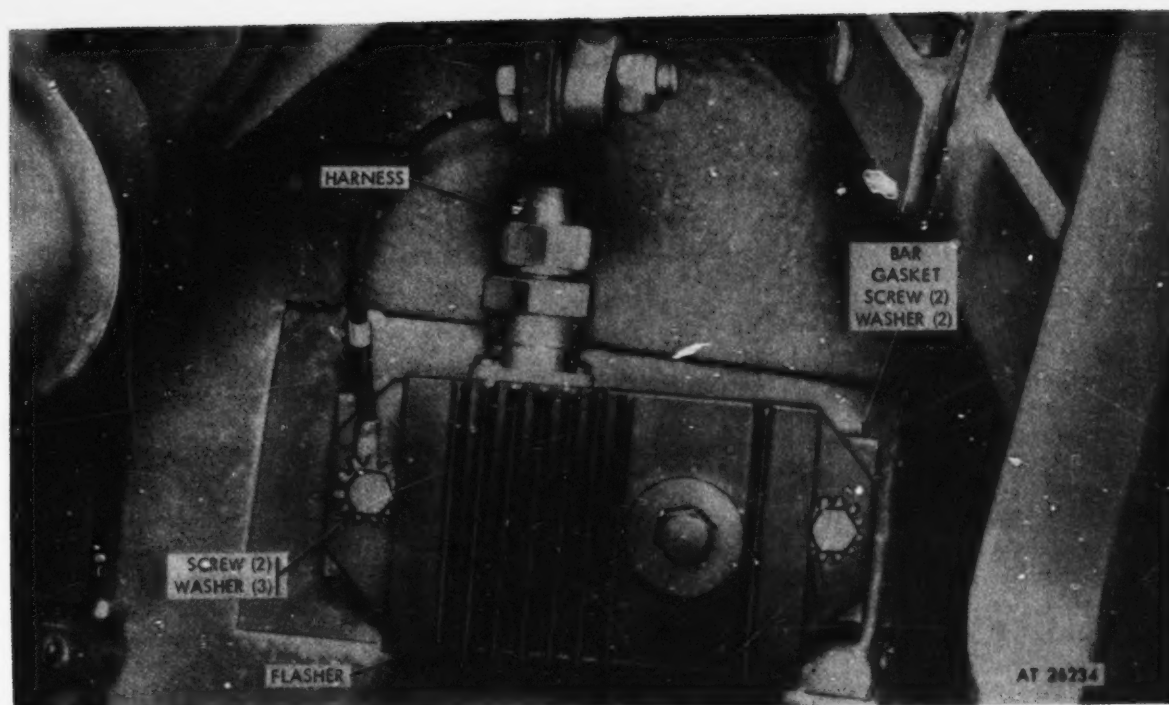


Figure 3-45. Flasher.

3-64. Reflector

(fig. 3-47)

NOTE

Maintenance of right and left reflectors is similar.

a. Removal.

(1) Remove stop light-tailight (para 2-121 and 3-60).

(2) Remove two screws and nuts securing reflector to hull, and remove reflector.

b. *Inspection and Repair.* Inspect reflector for cracked, broken, or missing lens. Replace reflector that shows any of these defects.

c. Installation.

(1) Position reflector on hull, and secure with two screws and nuts.

(2) Install stop light-tailight (para 2-121 and 3-60).

3-65. Trailer Electric Coupling Receptacle and Cover

Refer to paragraph 2-150 and see figure 3-33 for electrical connections when performing maintenance on the trailer electric coupling receptacle and cover.

Section IV. WINTERIZATION KIT

3-66. General

This section contains description and instructions for service upon receipt of materiel, preventive-maintenance, removal, inspection and repair, and installation for the winterization kit described in paragraph 3-67.

3-67. Description

a. General. The winterization kit is provided to make the carrier safe for use during extreme cold weather operation (between -25° and -65°F). The kit consists of a fabric arctic cab cover, lower cab insulation, seat covers, door window frost shields (thermal panels), replacement drive belts, and an engine coolant heater.

b. Cab Cover. The cab cover is an insulated fabric cab cover. When installed this cover prevents the loss of heat through the top of the carrier.

c. Lower Cab Insulation. The lower cab is insulated with polyvinyl chloride foam insulators to prevent the loss of heat through the cab.

d. Seat Covers. Seat covers are provided for the driver's seat, center seat, and right seat in the winterization kit. The covers are cloth and act as insulators to keep the temperature of the seats comfortable.

e. Frost Shields (thermal panels). The frost shields are thermal panels that mount on the door windows providing a space between the shields and windows to prevent frosting of the windows.

f. Drive Belts. Three sets of v-belts are provided with the winterization kit. The belts are replacements for the existing belts and are designed for extreme weather operation.

g. Coolant Heater. The engine coolant heater provides for starting the carrier during extreme cold weather operation between -25° and -65°F . The engine coolant heater heats and circulates the engine coolant through the engine and a battery box heat exchanger to warm the engine block, lubricating oil, and battery electrolyte when the engine is not in operation. The engine coolant heater is not intended as a quick preheat system.

3-68. Tabulated Data

Refer to table 3-8 for tabulated data pertaining to the engine coolant heater.

3-69. Service Upon Receipt of Materiel

a. General. Inspect the materiel to be sure it is in condition for use. Clean and prepare the materiel for service. Make a record of any missing or damaged parts and of any malfunctions. Correct deficiencies. Report serious deficiencies which appear to involve unsatisfactory design or material on DA Form 2407.

b. Specific Procedures.

(1) Inspect all assemblies, subassemblies, and components to be sure they are properly assembled and secured.

(2) Perform the before-operation checks and services (TM 9-1450-585-10).

(3) Perform the quarterly preventive-maintenance checks and services (para 3-30).

3-70. Preventive-Maintenance Checks and Services

Refer to table 3-9 for preventive-maintenance checks and services for the engine coolant heater.

3-71. Troubleshooting

a. General. This paragraph contains troubleshooting information and test for locating and correcting the troubles which may develop in the engine coolant heater. Each symptom of trouble or malfunction given for an individual unit or system is followed by a list of probable causes of the trouble and corrective actions necessary to remedy the malfunction.

b. Troubleshooting Table. Table 3-10 lists possible malfunctions (symptoms), probable causes, and corrective action (remedies) that can be performed by organizational maintenance personnel. Probable causes are listed in their order of probability and should be checked in that order during troubleshooting. Refer to TM 9-1450-585-10 for operational troubleshooting, and to paragraph 3-32 for electrical troubleshooting.

3-72. Electrical Troubleshooting

a. Circuit Diagram. See figure 3-19 for a circuit diagram of the engine coolant heater electrical system.

b. Troubleshooting.

(1) Refer to paragraph 2-18 for general information and paragraph 2-20 for test equipment for electrical troubleshooting.

(2) Refer to table 3-12 and see figure 3-20 for troubleshooting the engine coolant heater electrical system. Tests are given in order of probable component malfunction and should be checked in that order during troubleshooting.

3-73. Cab Cover (fig. 3-46)

a. Removal

(1) Unsnap 24 fasteners (10) from studs (20) on left window frame (17) and right window frame (21).

(2) Loosen rope (8) securing rear of cab cover (7) from tie down cleats.

(3) Unhook cab cover (7) blanket (9) from six tape fasteners (18).

(4) Unhook cab cover (7) from two tape fasteners (15).

(5) Lift and pull cab cover (7) forward off cab frame, and extend it in front of windshield frame.

(6) Slide cab cover (7) to one side to release the cover from channel of front mount (19).

(7) Remove lock nut (1), two washers (2), and screw (4) securing bracket (3) to right window frame (21). Loosen screw (5) and washer (6) and remove bracket (3).

(8) Remove lock nut (1), two washers (2), and screw (4) securing bracket (13) to left window frame (17). Remove nut (14), washer (12), screw (11), and bracket (13).

(9) If removal of tapes (15 or 18) is necessary, drill out rivets securing tapes.

b. Inspection and Repair

(1) Clean cab cover with soap and water.

(2) Inspect cab cover for cuts, tears, fraying, and loose stitching. Replace cab cover damaged beyond repair.

c. Installation

(1) If tapes (15 or 18) were removed, position tapes and secure with rivets.

(2) Install bracket (13) and secure to left window frame (17) with screw (11), washer (12), and nut (14). Align hole and install screw (4) two washers (2) and new lock nut (1).

(3) Position bracket (3) under screw (5) and washer (6) and install screw (4), two washers (2), and new lock nut (1). Tighten screw (5).

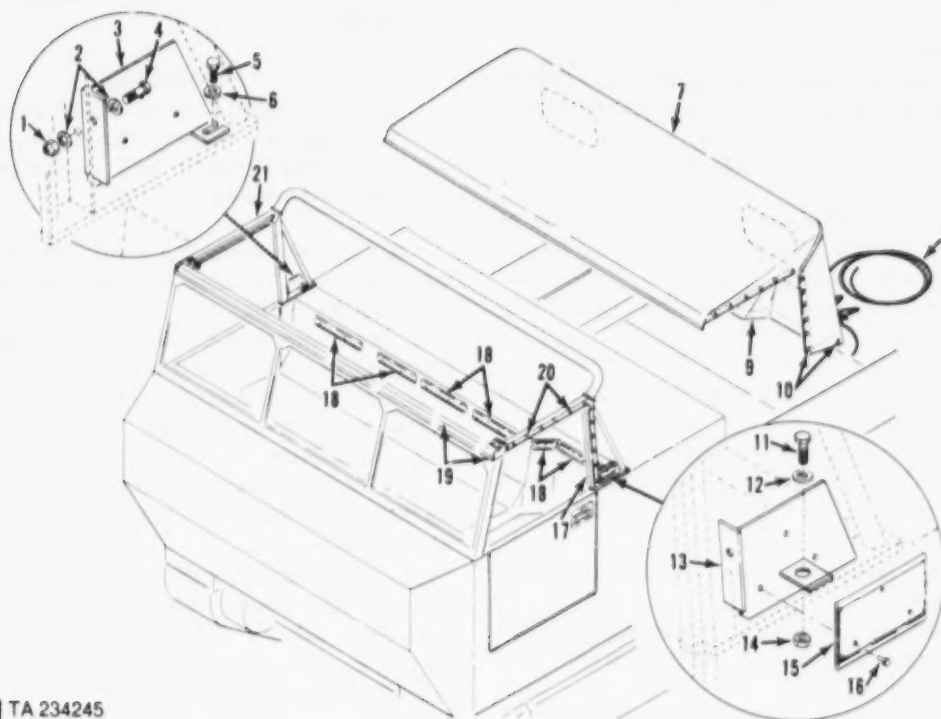
(4) Position cab cover (7) upside down in front of windshield.

(5) Insert front of cab cover (7) into front mount channel (19). Flip cab cover (7) over and on cab frame.

(6) Hook cover blanket (9) to six tape fasteners (18). Hook cover (7) to two tape fasteners (15).

(7) Secure the rear of cab cover (7) to cleats with rope (8).

(8) Snap 24 fasteners (10) to studs (20) on left and right window frames (17 and 21).



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Figure 3-46. Cab cover.

- | | |
|------------------|-------------------------|
| 1 Nut | 12 Washer |
| 2 Washer (2) | 13 Bracket |
| 3 Bracket | 14 Nut |
| 4 Screw | 15 Tape (2) |
| 5 Screw | 16 Rivet |
| 6 Washer | 17 Window frame (left) |
| 7 Cover | 18 Tape (6) |
| 8 Rope | 19 Front mount |
| 9 Blanket | 20 Stud (24) |
| 10 Fastener (24) | 21 Window frame (right) |
| 11 Screw | |

3-74. Cab Cover Windows (fig. 3-47)

a. Removal.

(1) Remove 18 locking nuts (5), screws (1), and 36 washers (2) securing two left window frames (3) and window (4). Discard locking nuts.

(2) Remove two left window frames (3) and window (4) from cab cover.

(3) Remove 18 locking nuts (5), screws (1), and 36 washers (2) securing two right window frames (3) and window (4). Discard locking nuts.

(4) Remove two right window frames (3) and window (4) from cab cover.

b. Inspection and Repair.

(1) Clean windows with soap and water, and a soft lint free cloth.

(2) Inspect windows for breaks, cracks, and scratches. If windows are damaged enough to affect vision, replace them.

c. Installation.

(1) Position window (4) with two window frames (3) on cab cover.

(2) Install 18 screws (1), 36 washers (2), and 18 new locking nuts (5) securing window (4) and two frames (3) to cab cover.

(3) Repeat steps 1 and 2 above for installation of the remaining window.

3-75. Lower Cab Insulation (fig. 3-48).

a. Removal.

NOTE

Remove lower cab insulation only if inspection indicates replacement is necessary. Refer to the instructions below for general procedures, and see figure 3-48 for identification of specific components.

(1) Remove as much of old insulation as possible by scraping.

WARNING

Harmful vapor. Use trichloroethylene solvent only in a well-ventilated area. Avoid breathing vapors and prolonged or repeated contact with skin.

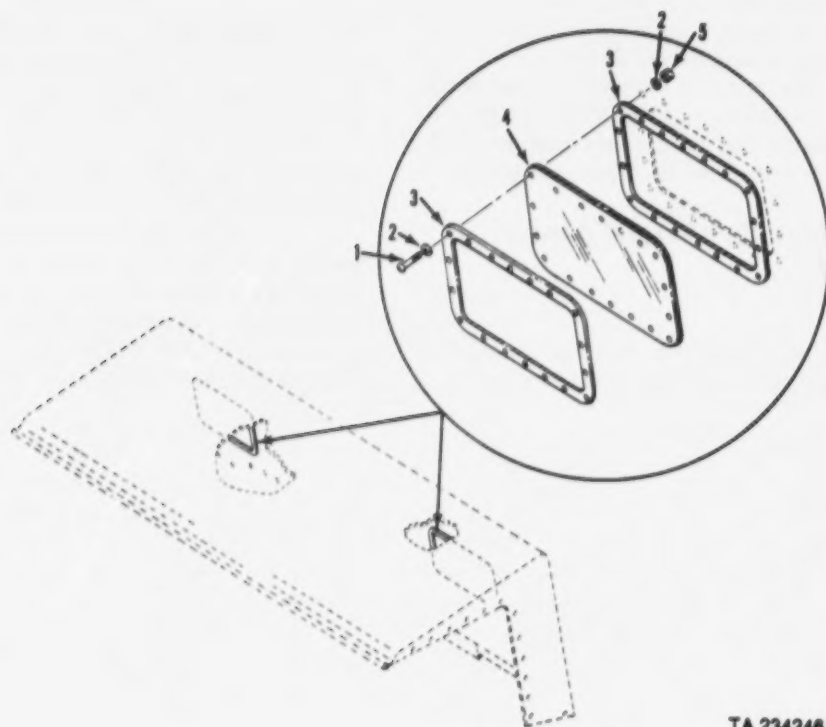
(2) Remove remaining insulation and adhesive with technical trichloroethylene solvent O-T-634 (6810-00-184-4800).

b. Inspection and Repair. Inspect lower cab insulation before removal for loss of adhesion, torn condition, and missing material. Replace insulation that shows any of these defects.

c. Installation.

(1) Trim insulation as required to fit. If panel to be installed is large, cut into sections of not over 3 square feet.

(2) Make certain surface to be covered is clean, dry, and free from grease. Spray or swab trichloroethylene solvent O-T-634 (6810-00-184-4800) on back of insulation to activate adhesive. Allow 10 to 15 seconds for adhesive to become tacky, and immediately press insulation firmly into position. When installing large panels, make certain sections are correctly butted together. Strap loops and other hardware must be accessible through the openings in the insulation.



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Figure 3-47. Cab cover windows.

Legend to fig. 3-47

- 1 Screw (36)
- 2 Washer (72)
- 3 Frame (4)
- 4 Window (2)
- 5 Nut (36)

3-76. Seat Covers (fig. 3-48)*a. Removal.*

- (1) Disengage right seat cover strap (28) and center seat strap (5), and remove straps.
- (2) Disengage two right tie-down straps (30), and remove right rod (29) from right seat cover (2).
- (3) Disengage three center tie-down straps (30), and remove center rod (6) from center seat cover (4).
- (4) Remove upper rods (1 and 3), right seat cover (2), and center seat cover (4) as a unit, and remove right seat cover from upper rod (1) and center seat cover from upper rod (3).
- (5) Remove two right tie-down straps (30) and three center tiedown straps (30).

(6) Untie cord securing driver's seat cover (35) to seat, remove three screws (34) securing driver's seat cover (35), and remove cover.

b. Inspection and Repair.

(1) Inspect covers for cuts, tears, fraying, loose stitching and missing webbing, and inspect driver's seat cover for missing tiecord. Refer to FM 10-16 for general repair of canvas and webbing. Replace cover damaged beyond repair.

(2) Inspect straps for missing buckles and strap ends, wear, and broken condition. Replace strap that shows excessive wear or either of the other defects.

(3) Inspect rods for distortion and broken condition. Remove distortion. Replace broken rod.

c. Installation.

(1) Position driver's seat cover (35) on seat, install three screws (34), and tie cord to secure driver's seat cover to seat.

(2) Install two right tie-down straps (30) and three center tie-down straps (30) in carrier cab.

(3) Position center seat cover (4) and right seat cover (2) on upper rods (1 and 3), and install rods and covers in cab as a unit.

(4) Install right seat cover strap (28) and center seat cover strap (5), make certain covers (2 and 4) are correctly positioned, and secure straps.

(5) Install right rod (29) in right seat cover (2), and secure cover with two right tie-down straps (30).

(6) Install center rod (6) in center seat cover (4), and secure cover with three tie-down straps (30).

3-77. Frost Shields (thermal panels)

(fig. 3-49).

a. Removal

(1) Remove front and rear thermal panels and sealing tape from front and rear window glasses.

WARNING

Harmful vapor. Use trichloroethylene solvent only in a well ventilated area. Avoid breathing vapors and prolonged or repeated contact with skin.

(2) Remove any remaining seal material and adhesive from window glasses, using technical trichloroethylene solvent O-T-634 (6810-00-184-4800).

b. *Inspection and Repair.* Inspect thermal panels before removal for cracked or broken condition, scored or etched surface, cut, broken, or deteriorated sealing tape, and loss of adhesion. If surface of panel is scored or etched sufficiently to affect visibility of panel or shows any of the other defects, replace panel.

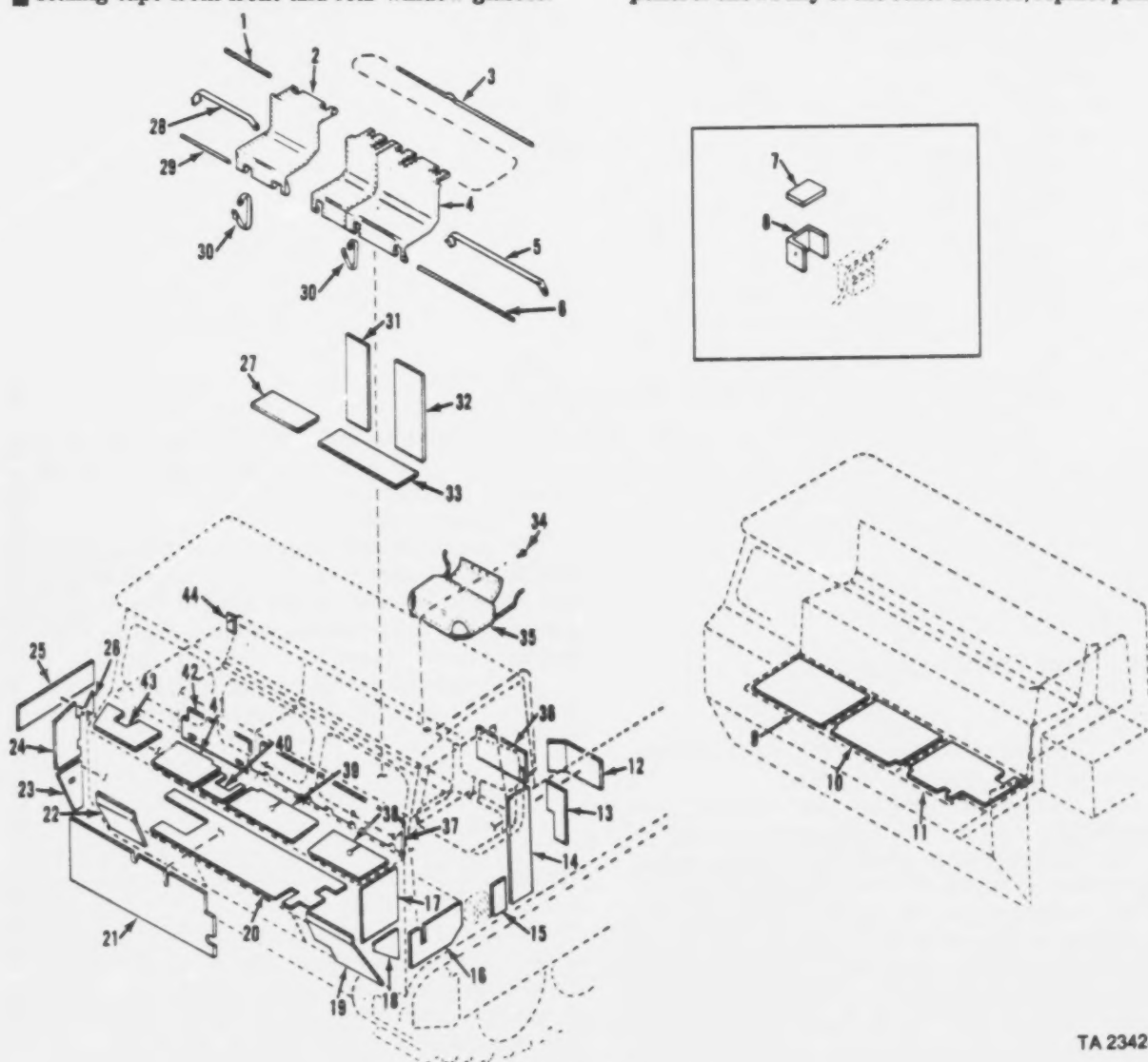


Figure 3-48. Cab insulation.

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c. Installation.

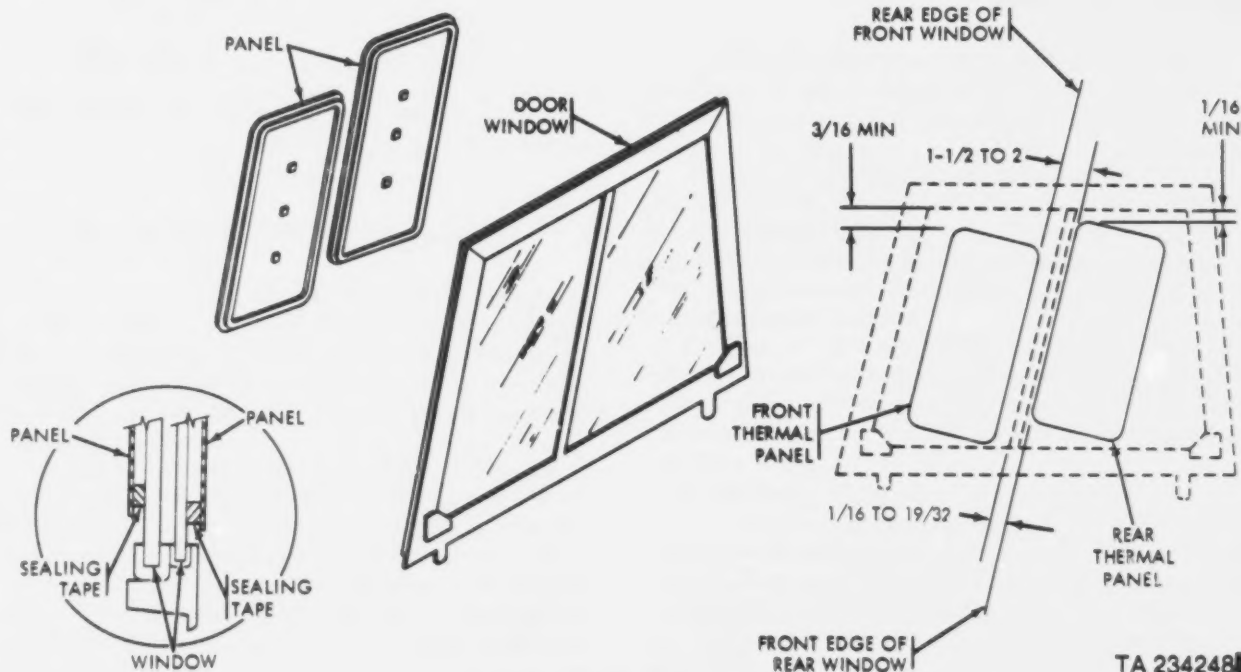
(1) Thoroughly clean front and rear window glasses, and wipe dry with clean, dry, lint-free cloths or specially prepared wiping papers.

(2) Remove protective backing from sealing

tape.

(3) Position front and rear thermal panels on front and rear window glasses, and press thermal panels securely in place.

NOTE: DIMENSIONS SHOWN
ARE IN INCHES



TA 234248

Figure 3-48. Thermal door windows — exploded view.

Legend to fig. 3-48

1 Rod	16 Insulation (11678081)	31 Insulation (11598388-12)
2 Cover (right)	17 Insulation (11613261)	32 Insulation (11598388-13)
3 Rod	18 Insulation (11598311)	33 Insulation (11598388-14)
4 Cover (center)	19 Insulation (11678074)	34 Screw (3)
5 Strap	20 Insulation (11678078)	35 Cover (driver's)
6 Rod	21 Insulation (11678077)	36 Insulation (11613262)
7 Insulation (11678068)	22 Insulation (11678067)	37 Insulation (11678080)
8 Insulation (11598388-4)	23 Insulation (11598391)	38 Insulation (11598394)
9 Insulation (11598388-5)	24 Insulation (11678079)	39 Insulation (11678089)
10 Insulation (11598319)	25 Insulation (11598314)	40 Insulation (11613257)
11 Insulation (11598320)	26 Insulation (11613258)	41 Insulation (11678073)
12 Insulation (11598388-11)	27 Insulation (11613255)	42 Insulation (11598398)
13 Insulation (11678075)	28 Strap	43 Insulation (11598395)
14 Insulation (11613259)	29 Rod	44 Insulation (11598388-10)
15 Insulation (11598388-15)	30 Strap	

3-78. Drive Belts.

- a. Refer to paragraph 2-81 for maintenance of the coolant pump drive-belts.
- b. Refer to paragraph 2-85 for maintenance of the fan drive-belts.
- c. Refer to paragraph 2-106 for maintenance of the generator drive-belts.

3-79. Coolant Heater.

Refer to paragraph 3-26 for information on the coolant heater.

CHAPTER 4

SHIPMENT AND DEMOLITION TO PREVENT ENEMY USE

Section I. DOMESTIC SHIPMENT AND LIMITED STORAGE

4-1. General

This section contains instructions for domestic shipping, limited storage, packaging of basic issue items, marking, and loading and blocking.

4-2. Domestic Shipping Instructions

a. Preparation for Shipment. When shipping the M730 and M730A1 Guided Missile Equipment Carriers, the officer in charge of preparing the shipment will be responsible for furnishing materiel in a serviceable condition, properly cleaned, processed, packaged, and packed.

b. Removal of Preservatives Prior to Shipment. Personnel withdrawing the M730 and M730A1 Guided Missile Equipment Carriers from storage for shipment must not remove preservatives other than to insure that the materiel is complete and serviceable. If it has been determined that preservatives have been removed, they must be restored to the prescribed level prior to shipment.

NOTE

Removal of preservatives is the responsibility of the organization receiving the shipment.

c. Army Shipping Documents. Prepare all army shipping documents in accordance with AR 725-50.

d. Shipping Closure. When carriers are prepared for shipment, the preparing unit will draw from supply or fabricate and install the closure. In case any parts of these closure are missing or closure fabrication is required, the details for fabrication, materials, and protective finishes are provided in paragraph 4-7.

4-3. Limited Storage Instructions

a. General.

(1) The M730 and M730A1 Guided Missile Equipment Carriers received for storage and already processed for shipment, as indicated in DD Form 1397 (Processing and Deprocessing Record for Ship-

ment, Storage and Issue of Vehicles and Spare Engine) must not be reprocessed, unless inspection performed on receipt of materiel reveals corrosion, deterioration, etc.

(2) Completely process the M730 and M730A1 Guided Missile Equipment Carrier upon receipt directly from manufacturing facilities or if the processing data on the tag indicates that preservatives have been rendered ineffective by operation or freight shipping damage.

(3) The M730 and M730A1 Guided Missile Equipment Carriers to be prepared for storage must be given a limited technical inspection. The results of the inspection and classification will be entered on DA Form 2404.

b. Receiving Inspections.

(1) Immediately upon receipt of the M730 and M730A1 Guided Missile Equipment Carriers for storage, they must be inspected and serviced as prescribed in paragraphs 2-1 and 2-2. Perform a systematic inspection and replace or repair all missing or broken parts. If repairs are beyond the scope of the unit and materiel will be inactivated for an appreciable length of time, place materiel in storage and attach tags specifying the repairs needed. The reports of these conditions will be submitted by the unit commander for action by a supporting maintenance unit.

(2) When materiel is inactivated, it will be processed.

(3) Prepare a DD Form 6 for all shipments received in a damaged or otherwise unsatisfactory condition, due to deficiencies in preservation, packaging, packing, marking, handling, loading, or storage and for apparently excessive preservation.

c. Storage Site. The preferred storage site for the M730 and M730A1 Guided Missile Equipment Carriers is under cover in dry, covered sheds. When it is necessary to store materiel outdoors, protect it against the elements as prescribed in TB 9-300-1/1 and TM 740-90-1.

d. Inspection During Storage. Perform a visual inspection periodically to determine general condition. If corrosion is found, remove it and clean, paint, and treat with the prescribed preservatives.

NOTE

Touchup painting will be in accordance with TM 9-13.

e. Removal From Storage.

(1) If the M730 and M730A1 Guided Missile Equipment Carriers are not shipped or issued upon expiration of the storage period, process as applicable.

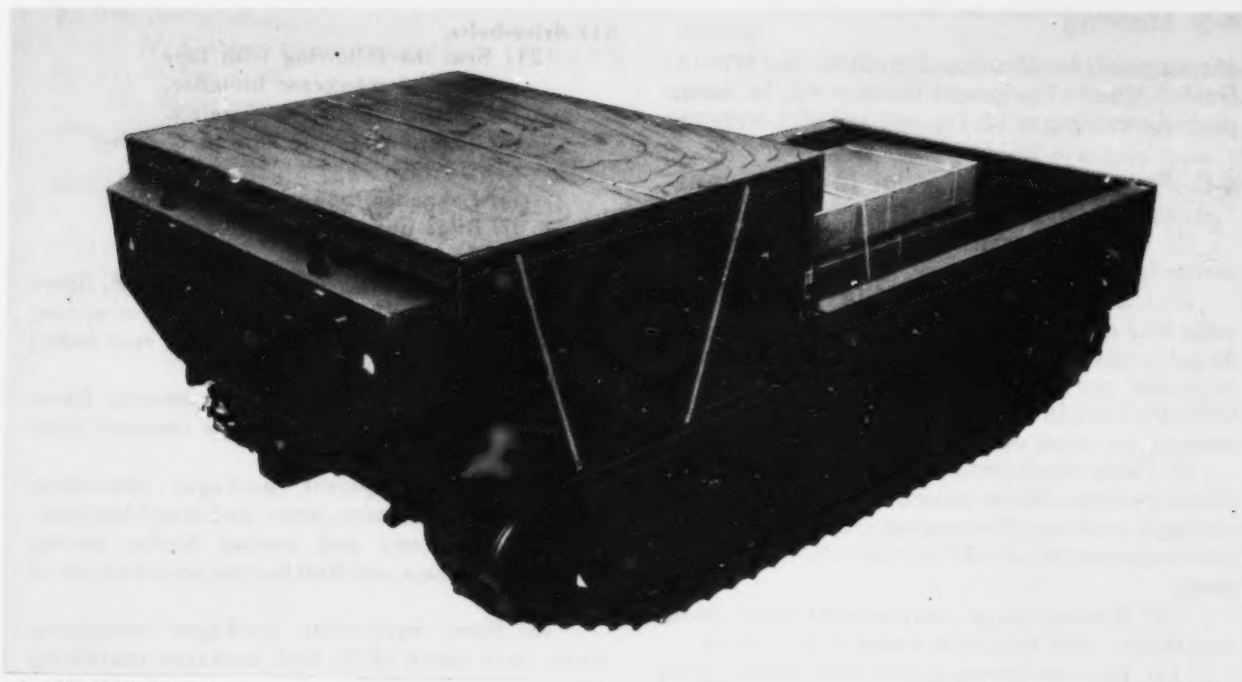
(2) If the M730 and M730A1 Guided Missile Equipment Carriers to be shipped will reach their destination within the storage period, it need not be reprocessed upon removal from storage, unless inspection reveals it to be necessary according to

anticipated in-transit weather conditions.

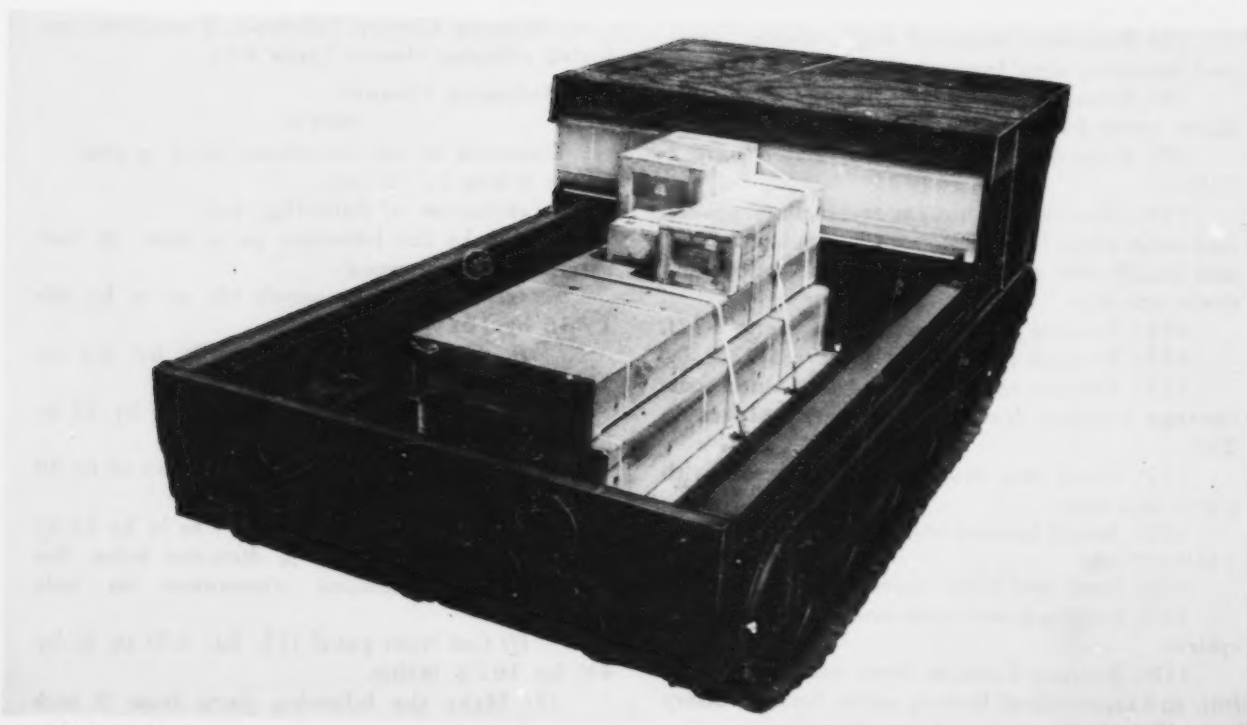
(3) When it has been ascertained that the M730 and M730A1 Guided Missile Equipment Carriers are to be placed into immediate service, deprocess them. Inspect and service them as prescribed in paragraphs 2-1 and 2-2.

4-4. Packaging and Packing of Basic Issue Items

Refer to TM 38-230, SB 746-1, SB 38-100, MIL-P-12841, and MIL-P-14232 for detailed information pertaining to packaging and packing of basic issue items materiel and to figure 4-1 for typical loading arrangement.



A-LEFT FRONT VIEW



B-RIGHT REAR VIEW

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Figure 4-1. Loading arrangement of basic issue items and vehicle components for shipment.

4-5. Marking

Marking and identification of the M730 and M730A1 Guided Missile Equipment Carriers will be accomplished according to TB 746-93-1 and MIL-STD-129.

4-6. Preparation of Carrier for Shipment

a. Removal of Items.

(1) Remove and package basic issue items from carrier (para 4-4).

(2) Unreel winch cable (TM 9-1450-585-10), clean cable with dry cleaning solvent (SD) or mineral spirits paint thinner, and apply a preservative coating of corrosion preventive compound MIL-C-16173D (8030-00-244-1294) to cable while cable is being rewound on winch drum.

(3) Clean winch control moving parts with dry cleaning solvent (SD) or mineral spirits paint thinner, and apply a preservative coating of corrosion preventive compound MIL-C-16173D (8030-00-244-1294) to parts.

(4) Remove cargo compartment cover, bows, stanchions, and stanchion bases (para 2-251).

(5) Remove towing hooks from carrier (para 2-234).

(6) Remove cab cover, cross bow, and side frames (para 2-231).

(7) Remove windshield wiper blades, arms, and attaching nuts from carrier (para 2-255).

(8) Remove side door windows from cab doors (para 2-226).

(9) Remove windshield from carrier (para 2-232).

(10) Remove hull bottom access plate, gasket, and drain plugs from bottom of hull (para 2-223), and install wire cloth screen over hull access and drain openings.

(11) Remove exhaust extension (para 2-77).

(12) Remove towing pintle (para 2-235).

(13) Remove right, left, and top center bow stowage brackets from front of carrier (para 2-251).

(14) Cover seat cushions and backrests with paper and tape.

(15) Install forward blast cover frame (TM 9-1450-585-10).

(16) Load and block carrier (para 4-8).

(17) Process power train components and fuel system.

(18) Remove batteries from carrier (para 2-98), and tape ends of battery cable. Secure battery mounting hardware to cables with tape.

(19) Disconnect air cleaner hose from engine air intake (para 2-74).

(20) Release tension on generator (para 2-106), fan (para 2-85), and coolant pump (para 2-

81) drive-belts.

(21) Seal the following with tape:

(a) Engine crankcase breather.

(b) Engine air intake opening.

(c) Engine gage rod shroud opening.

(d) Oil filler cap.

(e) Launcher mounting bolt holes.

(f) Bilge pump outlets.

(g) Light lenses.

(22) Position blast cover as shown in B, figure 2-28 (TM 9-1450-585-10), and secure by strapping around the front folded section and the rear folded section.

b. Packaging and Packing of Removed Items.

(1) Package or pack all items removed from the carrier.

(2) Stow equipment packages containing windshield wiper blades, arms, and attaching nuts; exhaust extension; and towing hooks, towing pintle, drain plugs, and hull bottom access covers in cab.

(3) Stow equipment packages containing basic issue items (BII) and packages containing cab cover, bows, windshield, cargo cover, side door window, and batteries in cargo compartment (fig. 4-1).

c. *Shipping Closure.* Fabricate, if required, and install shipping closure (para 4-7).

4-7. Shipping Closure

NOTE

Tolerance on all dimensions below is plus or minus 1 / 16 inch.

a. Fabrication of Parts (fig. 4-2).

(1) Make the following parts from 1/2 inch exterior grade plywood:

(a) Cut two top panels (2) to 1/2 by 40-1 / 16 by 102 1/2 inches each.

(b) Cut rear panel (3) to 1/2 by 7 1/2 by 101 1/2 inches.

(c) Cut right side panel (1) to 1/2 by 10 by 80 1/2 inches.

(d) Cut left side panel (6) to 1/2 by 10 by 39 inches.

(e) Cut left access panel (7) to 1/2 by 10 by 41 inches, and drill four 3/8 diameter holes. See figure 4-3 for detailed information on hole locations.

(f) Cut front panel (13, fig. 4-2) to 1/2 by 4 3/4 by 101 1/2 inches.

(2) Make the following parts from 2 inch nominal thickness group II or III box lumber:

(a) Cut four longitudinal frame supports (10) to 1 1/2 by 2 1/2 by 75-7 / 8 inches each.

(b) Cut two longitudinal frame supports (14) to 1 1/2 by 2 1/2 by 101 1/2 inches each.

(c) Cut two frame braces (11) to $1\frac{5}{8}$ by $2\frac{5}{8}$ by $5\frac{3}{8}$ inches each.

(d) Cut two frame braces (5) to $1\frac{5}{8}$ by $2\frac{5}{8}$ by $2\frac{3}{4}$ inches each.

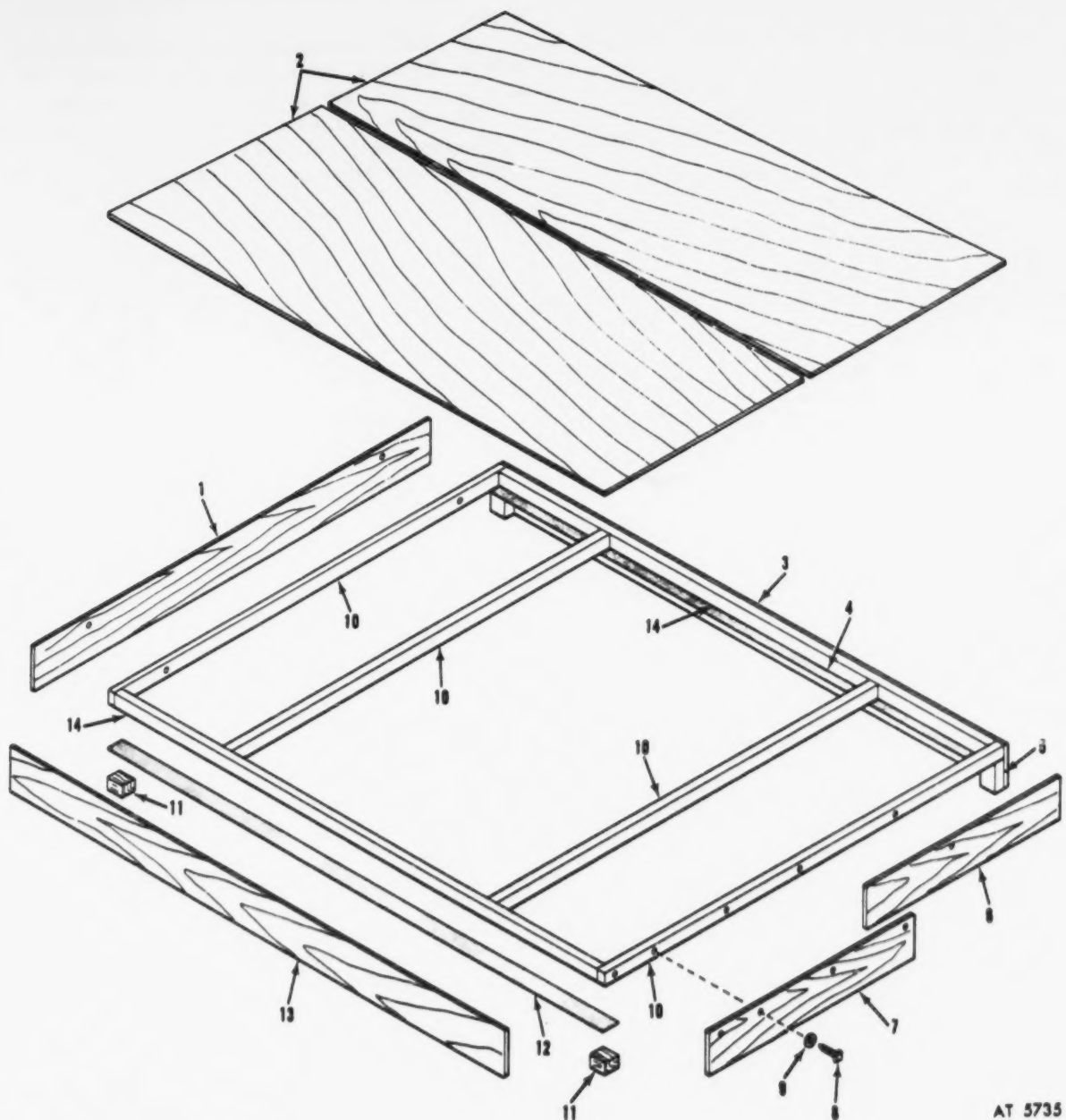
(3) Make vent screens from 0.048 diameter wire fabric, 4 x 4 mesh as follows:

(a) Cut vent screen (4) to $3\frac{1}{2}$ by $101\frac{1}{2}$ inches.

(b) Cut vent screen (12) to $2\frac{3}{4}$ by $101\frac{1}{2}$ inches.

(4) Make four supports from carbon steel flat stock $1/16$ or $1/8$ inch thickness. See figure 4-3 for detailed information on size and hole locations.

(5) Make two blast shield brackets from $1/4$ inch carbon steel flat stock. See figure 4-3 for detailed information on size and hole location.



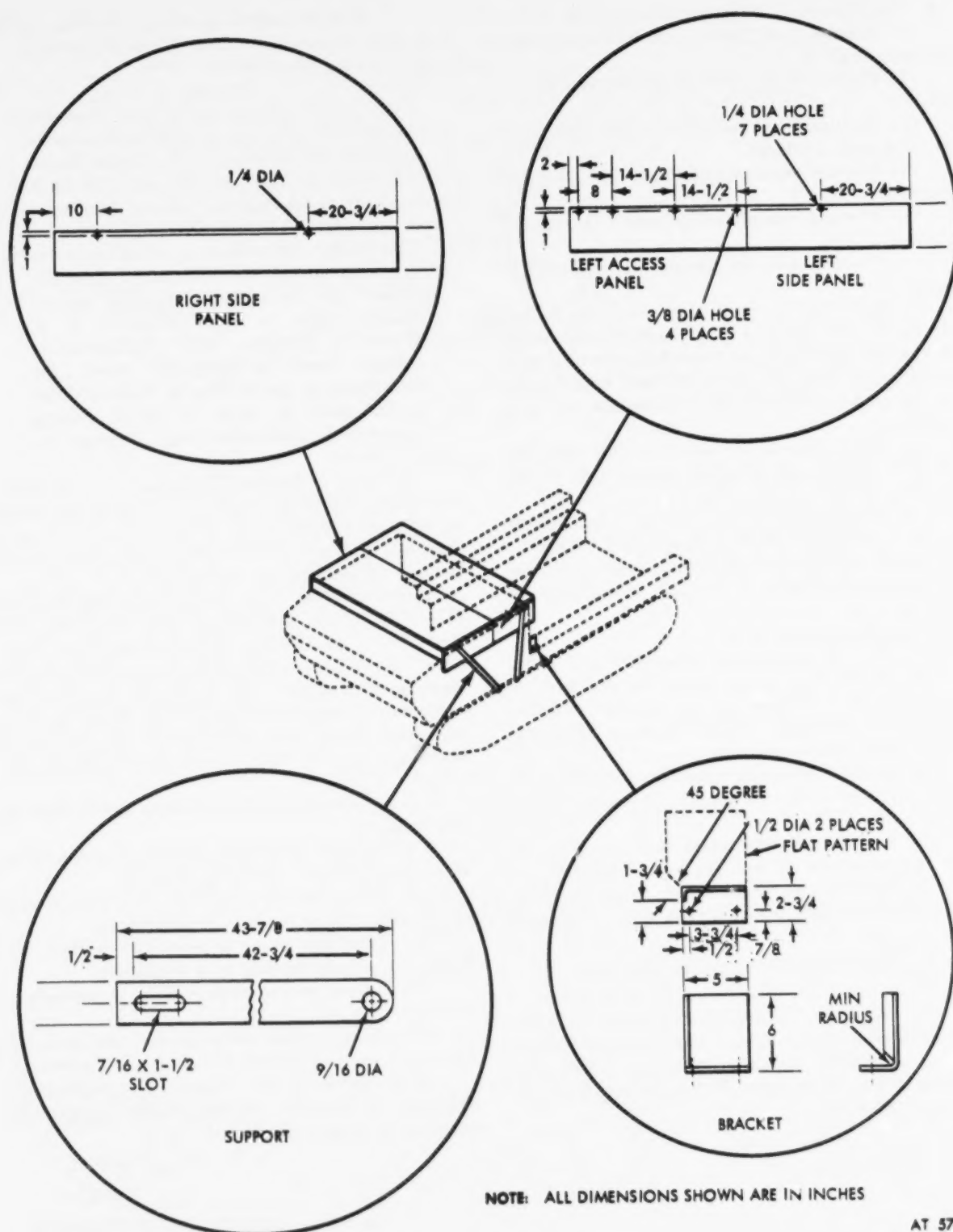
AT 5735

- 1 Right side panel (1)
- 2 Top panel (2)
- 3 Rear panel (1)
- 4 Rear vent screen (1)
- 5 Rear brace (2)

- 6 Left side panel (1)
- 7 Left access panel (1)
- 8 Lag bolt
- 9 Washer (7)

- 10 Frame (4)
- 11 Front brace (2)
- 12 Front vent screen (1)
- 13 Front panel
- 14 Frame (2)

Figure 4-2. Shipping closure—partial exploded view.



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Figure 4-3. Shipping closure components.

b. Fabrication of Shipping Closure (fig. 4-2).

(1) Position four frames (10) and two frames (14), and nail in place.

(2) Position side panels (1 and 6), and nail in place.

(3) Position front panel (13) and rear panel (3), and nail in place.

(4) Position vent screens (4 and 12), and nail in place.

(5) Position frame braces (5 and 11), and nail in place.

(6) Position two top panels (2), and nail in place.

(7) Drill five 1/4 inch diameter holes in left side frame (10) through side panel (6) and panel (7) of shipping closure and two holes on the right side through right side panel (1) and frame (10). See figure 4-3 for detailed information on hole locations.

(8) Finish exterior surface of closure assembly with olive drab lusterless alkyd enamel Spec TT-E-516, No. 34087 of Fed Std 595.

(9) Stencil on left access panel (7, fig. 4-2) of closure "TO SET OR RELEASE BRAKES — REMOVE THIS PANEL," with aviation yellow lusterless enamel Spec TT-E-527, No. 33538 of Fed Std 595.

c. Installation (fig. 2-1).

(1) Prepare carrier for shipment (par. 4-6).

(2) If left side access cover is attached to shipping closure, remove four lag bolts (4) and flat washers (3) securing access cover to shipping closure, and remove cover.

(3) Position shipping closure over cab, and secure to carrier with 4 straps (2), 12 washers (14), and 4 washers (3).

(4) Position left side access cover, and secure with four washers (3) and lag bolts (4).

(5) Position two blast shield brackets (13), and secure with four washers (12) and cap screws (11).

4-8. Loading and Blocking Instructions

a. Preparation for Shipments by Rail.

(1) Inspect all flatcars before loading for loose or broken floor planks. Check flatcars to see if they are in a suitable condition to safely carry the carriers to final destination. Reject flatcars if found to be unsatisfactory.

(2) Remove debris, previous blocking, nails, and other obstructions from floors of flatcars.

b. Loading (fig. 4-4).

NOTE

Take every precaution to see that the carriers are properly loaded and securely fastened and blocked to the flatcar floors.

(1) Refer to TM 38-230-1 and TM 38-230-2 for methods of loading and general loading rules.

WARNING

The height and width of materiel, when prepared for rail transportation, must not exceed the limitations indicated in the loading table in TM 38-230-1 & 2. Whenever possible, local transportation officers must be consulted about the limitations of the particular railroad lines to be used, in order to avoid delays, dangerous conditions, and damage to equipment.

(2) Govern loading procedures by capacity and length of flatcars available at time of shipment as well as requirements of bills of lading and shipping instructions. See figure 4-5 for normal location of carriers on flatcars.

c. Blocking (fig. 4-6). Refer to Pamphlet No. MD-7, "Rules Governing the Loading of Department of Defense Materiel on Open Top Cars," of the Association of American Railroads for blocking instructions. See figure 4-7 for blocking equipment. Copies of Pamphlet No. MD-7 may be requested from the Association of American Railroads, 59 E. Van Buren St., Chicago, IL 60605.

d. Safety Precautions for Loading and Unloading Flatcars.

(1) Exercise all normal and usual precautions when loading and unloading flatcars.

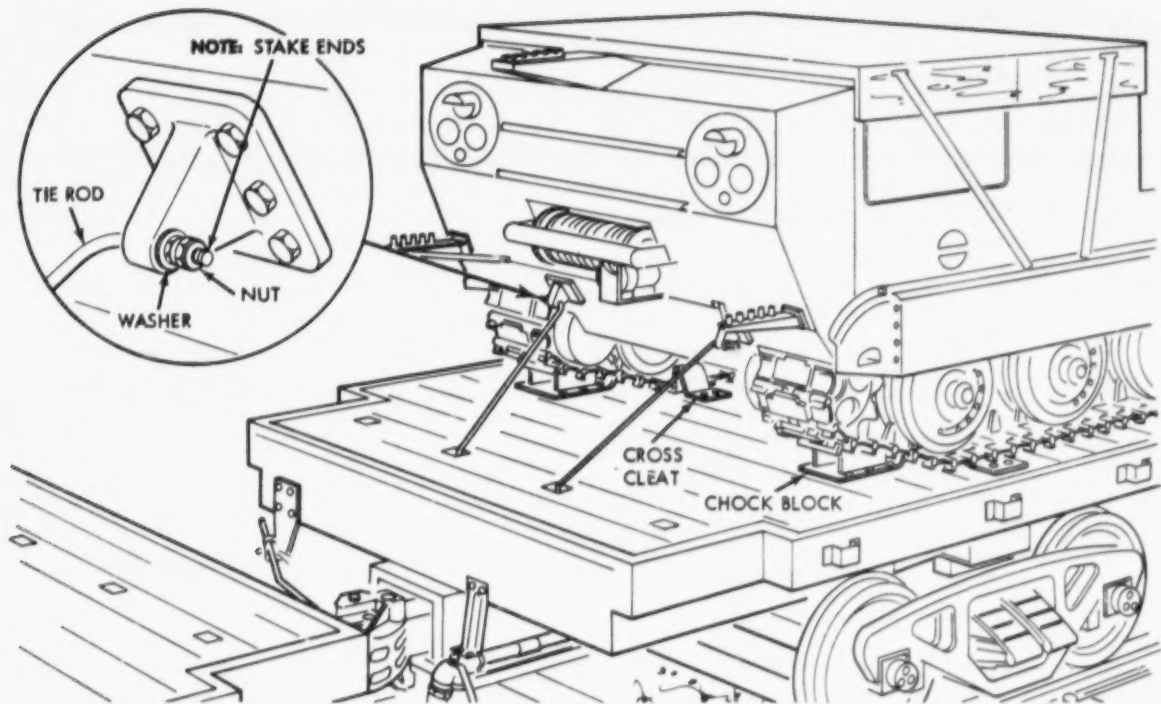
(2) Clean flatcars of all ice, snow, nails, and protrusions before loading or unloading.

(3) Carefully plan spacing of carriers on flatcar to reduce driving to a minimum.

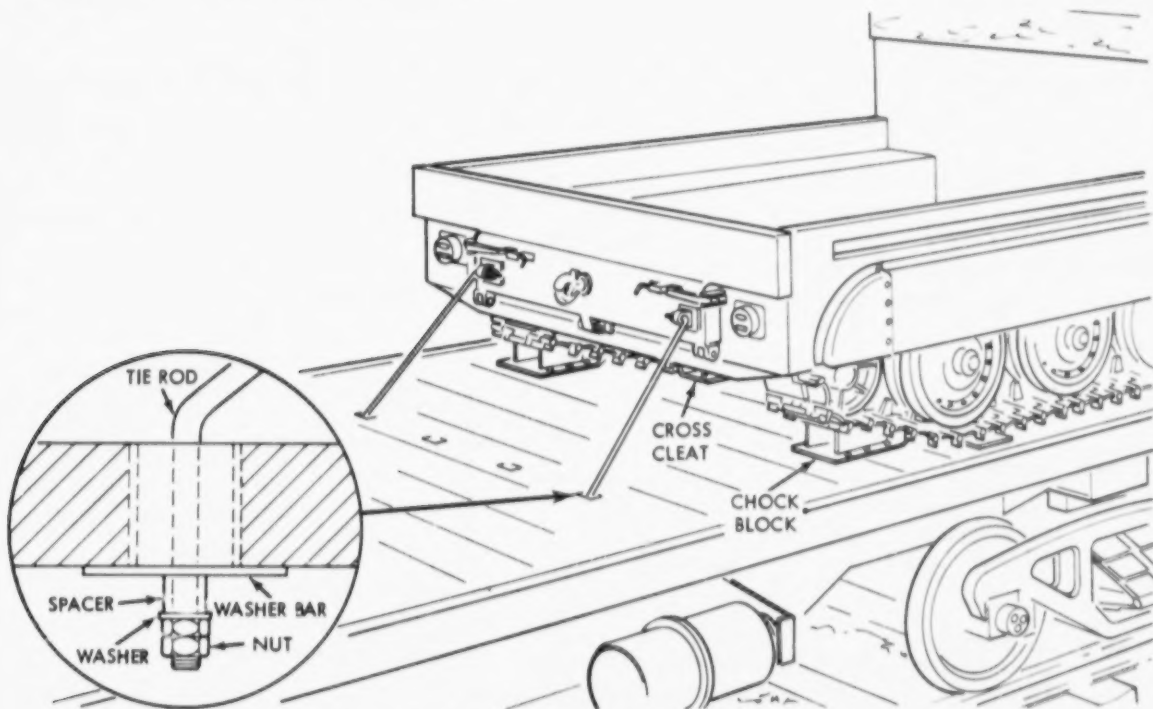
(4) Do not smoke while loading or unloading flatcars.

(5) Make certain all personnel are clear of front and rear of carrier before moving carrier.

e. Army Shipping Documents. Prepare all army shipping documents accompanying freight in accordance with AR 725-50.



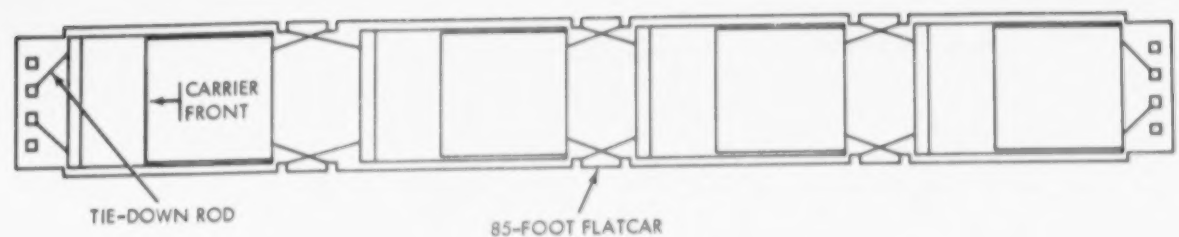
A-LOADING CARRIER ON FLATCAR - FRONT VIEW



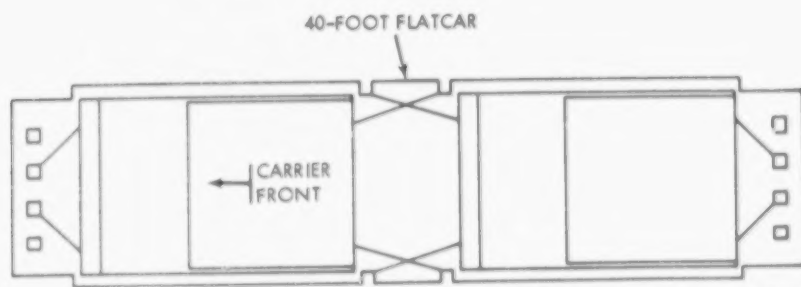
B-LOADING CARRIER ON FLATCAR - REAR VIEW

AT 3930

Figure 4-4. Loading carriers on flatcar.

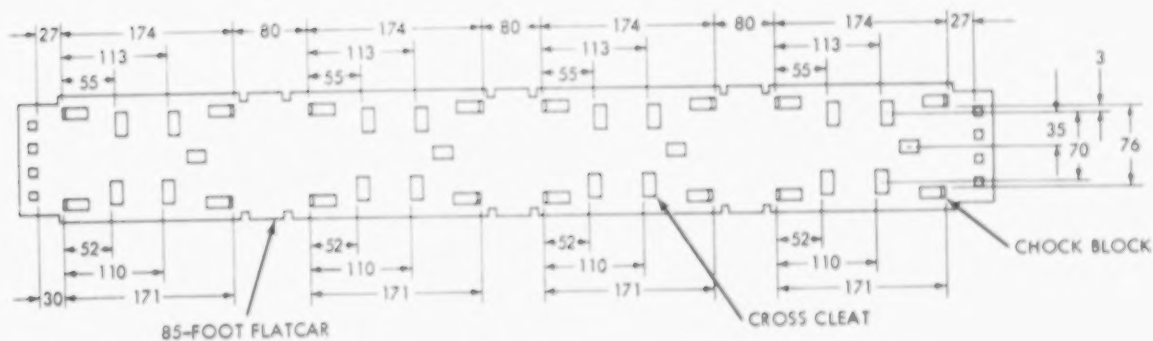


NOTE: TO SHIP ONE CARRIER, LOCATE AND TIE DOWN AS SHOWN FOR CARRIER ON THIS END



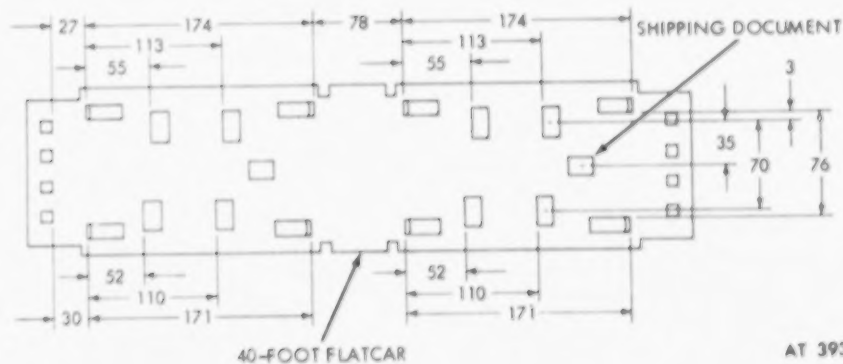
AT 3931

Figure 4-5. Location of carriers on flatcars.



NOTE: TO SHIP ONE CARRIER, CHOCK AND CLEAT AS SHOWN FOR CARRIER ON THIS END.

NOTE: ALL DIMENSIONS ARE GIVEN IN INCHES.



AT 3932

Figure 4-6. Blocking diagram.

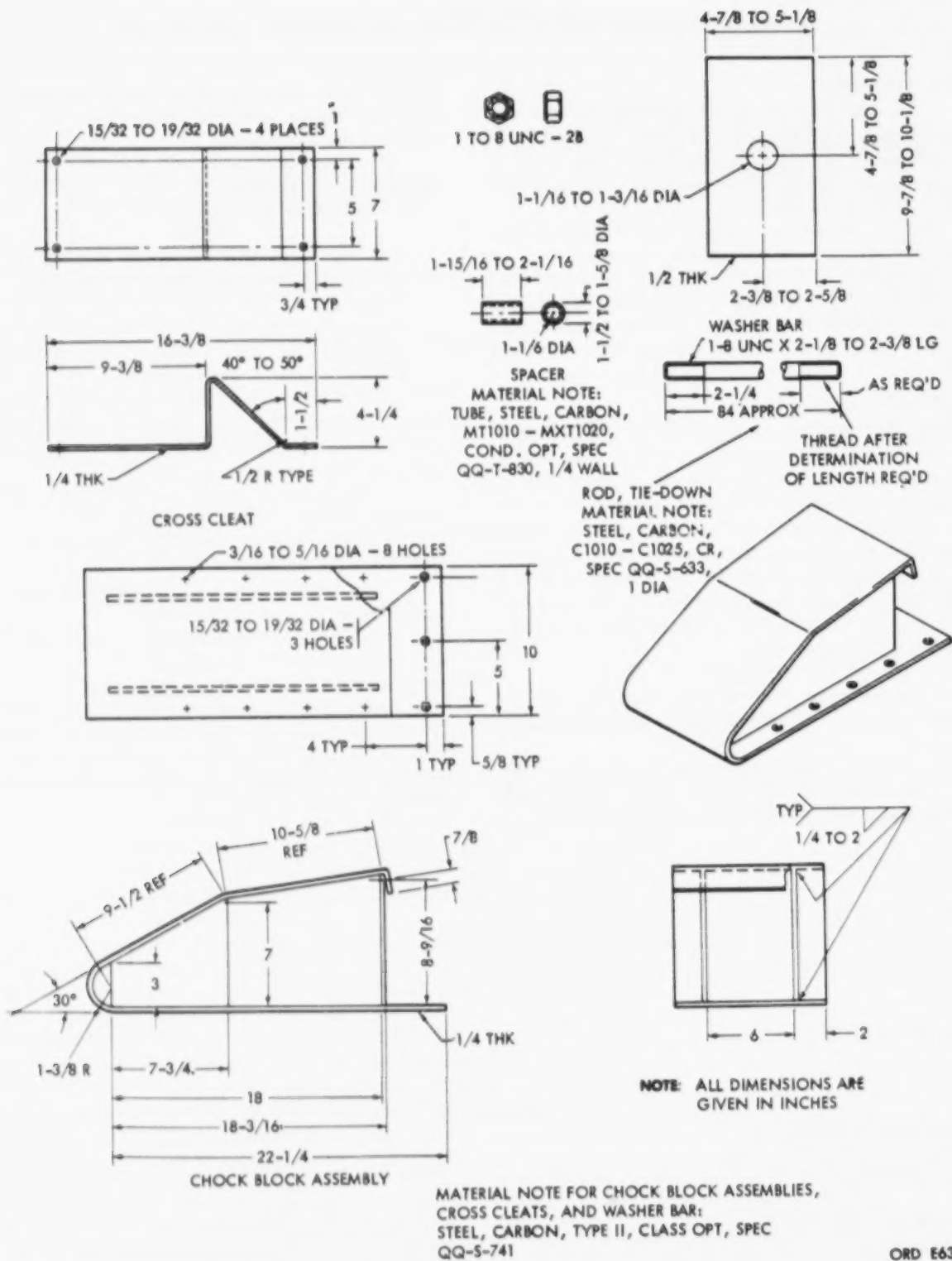


Figure 1-7. Blocking equipment.

Section II. DEMOLITION OF MATERIEL TO PREVENT ENEMY USE

4-9. General

a. For information and conditions under which destruction of the M730 and M730A1 Guided Missile Equipment Carriers to prevent enemy use should be undertaken, and for other methods of destruction, refer to TM 9-1450-585-10.

b. The procedure outlined in these paragraphs requires the use of demolition materials and explosives which normally may not be authorized items of issue to the using organization. The issue of these and related materials, and conditions under which destruction will be effected are command decisions in each case, according to the tactical situation.

4-10. Destruction of Carrier and Equipment

a. *General.* Although varying degrees of damage to the Aerial Intercept Guided Missile Subsystem may be expected incidental to the destruction of the carrier as outlined below, complete destruction of the entire carrier requires that applicable parts of the procedures in TM 9-1450-585-10 be coordinated with the methods employed for destruction of the carrier as outlined in b and c below.

b. *Demolition by Hand.*

(1) Remove and empty portable fire extinguisher, and discharge fixed fire extinguisher system.

(2) Using pick mattock, sledge, or other heavy implement, smash all vital elements such as fuel injectors, generator, lights, switches, instruments,

engine block, engine cylinder heads, transmission, propeller shafts, steering differential, and communications equipment.

(3) Drain fuel tank, and puncture it as near the bottom as possible.

c. *Demolition by Explosives.*

NOTE

For the successful execution method of destruction involving the use of demolition materials, all personnel concerned will be thoroughly familiar with the pertinent provisions of FM 5-25. Training and careful planning are essential.

(1) Prepare seven 2-pound demolition charges using 1-pound TNT blocks or equivalent together with necessary detonating cord to make up required charges. Place charges as follows:

(a) Set first charge on transfer gearcase housing at front end of engine.

(b) Set second and third charges on right and left sides of engine.

(c) Set fourth and fifth charges on right and left sides of control differential.

(d) Set sixth and seventh charges on right and left track drive sprockets.

(2) Connect all seven charges for simultaneous detonation with detonating cord.

(3) Provide for dual priming to minimize possibility of misfire. Danger area is approximately 500 yards. Elapsed time is approximately 10 minutes.

APPENDIX A

REFERENCES

1. Publication Indexes

The following indexes should be consulted frequently for latest changes or revisions of references given in

this appendix and for new publications relating to materiel covered in this technical manual.

a. Military Publication Indexes.

Index of Motion Pictures and Related Audio-Visual Aids	DA Pam 108-1
Index of Administrative Publications	DA Pam 310-1
Index of Blank Forms	DA Pam 310-2
Index of Doctrinal, Training, and Organizational Publications	DA Pam 310-3
Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, and Lubrication Orders	DA Pam 310-4
Index of Modification Work Orders	DA Pam 310-7

b. General References.

Accident Reporting and Records	AR 385-40
Requisitioning, Receipt and Issue System	AR 725-50
Color, Marking, and Preparation of Equipment for Shipment	AR 746-1
Malfunction, Involving Ammunition and Explosives	AR 75-1

2. Pertinent Publications

Explosives and Demolitions	FM 5-25
Lubrication Order: Carrier, Guided Missile Equipment: M730 and M730A1	LO 9-1450-585-12
Preservation, Packaging, Packing, and Marking Materials, Supplies and Equipment Used by the Army	SB 38-100
Publications for Packaging Army General Supplies	SB 746-1
Color and Marking of Military Vehicles, Construction Equipment and Materials Handling Equipment	TB 746-93-1
Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems	TB 750-651
Preservation, Packaging, and Packing of Military Supplies and Equipment: Preservation and Packaging (Volume I)	TM 38-230-1
Preservation, Packaging and Packing of Military Supplies and Equipment: Packing (Volume II)	TM 38-230-2
The Army Maintenance Management System (TAMMS)	TM 38-750
Operator, Organizational, DS, GS, and Depot Maintenance Manual: Welding Set, Arc, Inert Gas Shielded: Plastic or Metal Lined Gun; for 3/64 in. Wire; dc, 115v (Westinghouse Model SA-135) FSN 3431-879-9709	TM 5-3431-200-15
Organizational, Maintenance Repair Parts and Special Tool Lists: Welding Set, Arc, Inert Gas Shielded: Plastic or Metal Lined Gun; for 3/64 in. Wire; dc, 115v (Westinghouse Model SA-135) FSN 3431-879-9709	TM 5-3431-200-20P
Administrative Storage of Equipment	TM 740-90-1
Organizational Maintenance Manual Destruction of Equipment to Prevent Enemy Use (Launch Guided Missile System)	TM 750-244-4-1
Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use (U.S. Army-Tank Automotive Command)	TM 750-244-6
Cooling Systems: Tactical Vehicles	TM 750-254

Operator's Manual: Carrier, Guided	
Missile Equipment: M730 and M730A1	TM 9-1450-585-10
Organizational Maintenance Repair Parts and	
Special Tools List: Carrier, Guided	
Missile Equipment: M730 and M730A1	TM 9-1450-585-20P
Paint Instructions for Field Use	TM 9-213
Antifriction bearings	TM 9-214
Operations, Organizational, Direct Support and General	
Support Maintenance Manual Storage Batteries: Lead-Acid Type	TM 9-6140-200-14
3. Forms	
Recommended Changes to Publications	DA Form 2028
Equipment Inspection and Maintenance Work Sheet	DA Form 2404
Maintenance Request	DA Form 2407
Equipment LOG Assembly (Records)	DA Form 2408
Equipment, Daily or Monthly Log	DA Form 2408-1
Equipment Modification Record	DA Form 2408-5
Processing and Deprocessing Record for Shipment, Storage and	
Issue of Vehicles and Spare Engines	DD Form 1397
Preventive Maintenance Schedule and Record	DD Form 314
Report of Packaging and Handling Deficiencies	DD Form 6

APPENDIX B

MAINTENANCE ALLOCATION CHART

CARRIER, GUIDED MISSILE EQUIPMENT,

SELF-PROPELLED: M730 AND M730A1

Section I. INTRODUCTION

B-1. General

The Maintenance Allocation Chart designates overall responsibility for the maintenance functions on the end item or assembly. Repair and/or rebuild or major assemblies is designated by the specified subfunctions listed in the Maintenance Allocation Chart. Deviation from maintenance operations allocated in the Maintenance Allocation Chart are authorized only upon approval of the Major Army Commander concerned.

B-2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

- a. Inspect.* To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.
- b. Test.* To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
- c. Service.* To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.
- d. Adjust.* To rectify to the extent necessary to bring into proper operating range.
- e. Align.* To adjust specified variable elements of an item to bring to optimum performance.
- f. Calibrate.* To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standards.
- g. Install.* To set up for use in an operational environment such as an emplacement, site, or vehicle.
- h. Replace.* To replace unserviceable items with serviceable items.
- i. Repair.* Those maintenance operations necessary to restore an item to serviceable condition

through correction of material damage or a specific failure. Repair may be accomplished at each category of maintenance.

j. Overhaul. Consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

k. Rebuild. The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations of other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

l. Symbols. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed:

- C—Operator / crew
- O—Organizational maintenance
- F—Direct support maintenance
- H—General support maintenance
- D—Depot maintenance

B-3. Explanation of Columns:

- a. Column 1, Group Number.* Column 1 lists group numbers, the purpose of which is to identify the subassembly and/or part within the major assembly.
- b. Column 2, Functional Group.* Column 2 lists the major assemblies and the noun names of components, assemblies, subassemblies, and modules on which maintenance is authorized.
- c. Column 3, Maintenance Functions.* The symbols placed under the maintenance functions listed in column 3 indicate the lowest level at which that particular maintenance function is to be performed.
- d. Column 4, Tools and Equipment.* Column 4

TM 9-1430-305-20

references the special tool and equipment listed in table B-1 required to perform a maintenance function checked in column 3.

e. Column 5, Remarks. Column 5 is self-explanatory.

MAINTENANCE ALLOCATION CHART FOR

Carrier, Guided Missile Equipment, Self-Propelled: M730 AND M730A1

(1) Group No.	(2) Functional group	(3) Maintenance functions										(4) Tools and equipment	(5) Remarks	
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul			Rebuild
0100	GROUP 01 ENGINE POWER PLANT	C	..	C	..	..	..	..	O	..	..	..	1, Table B-1	Remove and install
	ENGINE	..	..	C	..	..	..	..	F	F	H	D	1 through 12, Table B-1	
0101	HEAD, engine cylinder	..	..	..	..	..	..	..	F	F	H	..	11, 12, and 13, Table B-1	14, 15, and 16, Table B-1
0102	SLEEVE, cylinder	..	..	..	..	..	..	..	H	..	..	..		
	BEARING, main crankshaft	..	..	..	..	..	..	..	H	..	..	..	17, Table B-1	
	CRANKSHAFT	..	..	..	..	..	..	..	H	..	..	..		
	PULLEY, crankshaft	..	..	..	..	..	..	..	..	F	..	..	..	
0103	SEAL, oil, crankshaft front and rear	..	..	..	..	..	..	..	F	..	..	..	18 and 19, Table B-1	20, Table B-1
	FLYWHEEL	..	..	..	..	..	..	..	F	H	..	..		
	GEAR, flywheel (starter)	..	..	..	..	..	..	..	..	F	..	..	..	
0104	BEARING, crankshaft	..	..	..	..	..	..	..	H	..	..	..	21, Table B-1	22 and 23, Table B-1
0105	PISTON	..	..	..	..	..	..	..	H	..	..	..		
	RINGS	..	..	..	..	..	..	..	H	..	..	..		
	ROD, connecting	..	..	..	..	..	..	..	H	..	..	..	24, Table B-1	
	ARM, rocker	..	..	..	F	..	..	..	F	F	F	..		
	BRIDGE, rocker arm	..	..	..	..	..	..	..	F	..	..	..	25 and 26, Table B-1	
	CAMSHAFT AND BEARINGS	..	..	..	..	..	..	..	F	..	..	..		
	FOLLOWER, cam	..	..	..	..	..	..	..	F	..	..	..	27 and 28, Table B-1	
	GEARS, engine timing and fuel pump drive	..	..	..	..	..	..	..	H	..	..	..		
	GUIDE, valve	..	..	..	..	..	..	..	..	F	..	..	..	29 and 30, Table B-1
	INSERT, valve (seat)	..	..	..	..	..	..	..	..	F	..	..	..	
	0106	ROD, push	..	..	..	..	..	..	..	F	..	..	..	31 and 32, Table B-1
		SEAL, camshaft	..	..	..	..	..	..	..	F	..	..	..	
SPRING, valve		..	..	..	..	..	..	..	F	..	..	..	33, Table B-1	
VALVE, exhaust		..	..	..	F	..	..	..	F	..	..	..		
CAN, air box drain and engine breather		..	..	O	..	..	..	O	..	..	..	..	25 and 34, Table B-1	
CAP, engine oil filler		..	..	..	..	..	..	..	O	..	..	..		
COOLER, engine oil		..	..	..	..	..	..	..	F	F	..	..	25 and 34, Table B-1	
CORE, engine oil cooler		..	..	..	..	..	..	..	F	..	..	..		
ELEMENT, engine oil filter		..	..	..	..	..	..	..	O	..	..	..	25 and 34, Table B-1	
FILTER, engine oil		..	..	O	..	..	..	..	O	..	..	..		
GAGE, (dipstick) engine oil		..	..	..	..	..	..	..	O	..	..	..	25 and 34, Table B-1	
GEAR, drive, oil pump		..	..	..	..	..	..	..	H	..	..	..		
PAN, engine oil		..	..	..	..	..	..	..	..	F	F	..	..	25 and 34, Table B-1
PUMP, engine oil		..	..	..	..	..	..	..	..	H	H	..	..	
REGULATOR, engine oil pressure		..	..	..	..	..	..	..	..	F	F	..	..	25 and 34, Table B-1
SCREEN, engine oil pump		..	..	..	..	..	..	..	..	F	..	..	..	
	TUBES, air box drain	..	..	..	..	..	..	..	O	..	..	..		

(1) Group No.	(2) Functional group	(3) Maintenance functions										(4) Tools and equipment	(5) Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	
	GROUP 01 ENGINE — Continued												
	VALVE, bypass, oil cooler								F				
	VALVE, drain, oil cooler								O				
0108	MANIFOLD, exhaust								F				
0109	GEAR, drive, air blower								F				
	QUILL, gear, air blower								F				17, Table B-1
	GROUP 03 FUEL SYSTEM												
0301	INJECTOR, fuel, engine		H		F				F	H			31 and 35 through 47, Table B-1
	LEVER, LINK, AND TUBE, control, fuel injector				F				F				
	TUBES AND FITTINGS, fuel injector								F				48, Table B-1
0302	PUMP, fuel, engine		O						O	H			49 and 50, Table B-1
	PUMP, fuel compartment-to-engine		O						O				
0304	CLEANER, engine air			O					O	F			
	ELEMENT, engine air cleaner			C					O				
	HOSE AND CLAMPS, engine air cleaner								O				
0305	BLOWER, engine air								F	H	H		51, Table B-1
0306	CAP, filler, fuel compartment COMPARTMENT, fuel Permanent repair								O				
	Temporary repair									O			
	LINES AND FITTINGS, fuel (engine and vehicle)								O				
	TANK, air separator									F			
	VENT AND SCREEN, fuel compartment								O				
0308	GOVERNOR				F				F	H	H		
0309	ELEMENTS, engine fuel filter								O				
	FILTERS, engine fuel			C					O	O			
0311	ACCUMULATOR, air box heater (early models)	C		O					O	F			52, Table B-1
	COIL, ignitor, air box heater								O				
	GAGE, pressure, accumulator (early models)	C							O				
	IGNITOR AND NOZZLE, air box heater								O				
	HARNES AND CABLE, air box heater								O				
	LINES AND FITTINGS, accumulator (early models)								O				
	PUMP, accumulator pressure (early models)								O	O			
	VALVE, solenoid, air box heater								O				
0312	CONTROLS AND LINKAGE, throttle, accelerator pedal, and fuel cutoff				O				O				
	GROUP 04 EXHAUST SYSTEM												
0401	MUFFLER								O				
	PIPES, exhaust								O				
	GROUP 05 COOLING SYSTEM												
0501	RADIATOR		F	C					O	F			100, Table B-1
0502	SEAL, radiator air duct								O				
0503	PIPES AND HOSES, coolant				O				O				
	THERMOSTAT		O						O				

(1) Group No.	(2) Functional group	(3) Maintenance functions										(4) Tools and equipment	(5) Remarks	
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul			Rebuild
	GROUP 05 COOLING SYSTEM — Continued													
0503	BELT, drive, coolant pump				O				O					
	PUMP, coolant								O	F				
0505	BEARING, cooling fan drive shaft								F					
	BELTS, cooling fan drive			O					O					
	BRACKETS, cooling fan drive shaft								F					
	FAN, cooling								O	H				
	LINK, cooling fan idler			O					O					
	PULLEY, cooling fan and idler								O					
	SEAL, cooling fan shroud								O					
	SHAFT, cooling fan drive								F					
	GROUP 06 ELECTRICAL													
0601	BELT, generator drive				O				O					
	GENERATOR, alternating current		O						O	F	H			
0602	RECTIFIER (early models)		O						O					
	REGULATOR		O		O				O	F				
0603	RELAY, starter		O						O					
	STARTER		O						O	F	H			
0607	BREAKER, circuit, instrument panel		O						O					
	GAGES, electric								O					
	LAMPS, LIGHTS, AND SWITCHES								O					
0608	BREAKER, circuit, generator- regulator, and bilge pump								O					
	SWITCHES, miscellaneous								O					
0609	LIGHTS, LAMPS, AND LAMP UNITS, head, tail, and B.O. marker								O	O				
0610	TRANSMITTERS AND SWITCHES, fuel compartment, engine transmission, and differential								O					
0611	HORN								O					
0612	BATTERIES	C	O	C					O	F				
	MOUNTS, resilient, battery frame								O					
	RECEPTACLE, auxiliary power								O					
0613	HARNESS, wiring, hull and power plant								F	O				
	RECEPTACLE, electric, trailer coupling								O	O				
	GROUP 07 TRANSMISSION													
0705	RANGE SELECTOR AND LINKAGE				O				O	O				
0710	GAGE, (dipstick), oil level								O					
0710	GEARS, CARRIERS, PISTONS, PLATES HOUSING, SHAFTS, BEARINGS, COVERS, AND OIL PAN								H				53 through 65, Table B-1	
	SEALS, input and output shaft								F				60, 66, and 67, Table B-1	

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
	GROUP 07 TRANSMISSION — Continued													
0710 (Cont)	TRANSMISSION			C					F	F	H	D	68 and 69, 69, Table b-1	
0721	CORE, transmission oil cooler								F					
	ELEMENT, oil filter								O					
	HOSES, FITTINGS, AND TUBES								O					
	PUMP, oil, front and rear								H				70, Table B-1	
	TUBE, pitot								H				70, Table B-1	
	VALVE, control and bypass								H					
	GROUP 08 TRANSFER ASSEMBLY													
0801	MOUNTS, transfer gearcase								O				71, Table B-1	
	PULLEYS, fan and generator drive								H					
	SEAL, pulley drive shafts								F					
	SHAFT, BEARINGS, AND GEARS								H				72, Table B-1	
0802	TRANSFER GEARCASE			C					F	F	H	D		
0804	DISCONNECT CONTROLS				O				O	O				
	HOSES AND FITTINGS								O					
	GROUP 09 PROPELLER AND PROPELLER SHAFTS													
0900	JOINT, universal, differential- to-final drive and transmission-to-differential			O					O	O			73, Table B-1	
	SHAFT, differential-to-final drive and transmission- to-differential								O				73, Table B-1	
	GROUP 11 DIFFERENTIAL AND FINAL DRIVES													
1124	BANDS, steering brake (internal)				O				F	F				
	CORE, differential oil cooler								O					
	DIFFERENTIAL, control			C					F	F	H	D	1, Table B-1	
	DRIVE, final			C					C	F	H	D	74, Table B-1	
	FILTER AND ELEMENT, differential			O					O					
	GAGE, (dipstick) final drive and differential								O					
	GEARS, PINIONS, BEARINGS, SHAFTS, AND OUTPUT													
	SEAL, final drive								H				75, 76, and 77, Table B-1	
	GEARS, PINIONS, SHAFTS, CARRIERS AND BEARINGS, differential								H				78 through 83, Table B-1	
	HOSES AND FITTINGS, oil, differential								O					
	MOUNTS, differential								O				71, Table B-1	
	PUMP, oil, lubrication, differential								O					
	SEALS, differential								H				82, Table B-1	
	SEALS, final drive pinion								O					

(1) Group No. Group	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
	GROUP 11 DIFFERENTIAL AND FINAL DRIVES —Continued													
1124	VALVE, relief, differential													
(Cont)	oil pump								O					
	GROUP 13 SUSPENSION													
1301	ANCHOR, torsion bar								O					
	BAR, torsion								O					84 through 86, Table B-1
1303	ADJUSTER, track tension			C	C				O	F				87, Table B-1
	ARM, idler wheel (M730)								O	F				
	ARM, idler wheel (M730A1)								O	F				
	BEARINGS, SEALS, AND HUBS				O				O					88 and 89, Table B-1
	WHEEL, idler								O					
1304	CUSHION, drive sprocket carrier								O					
	SPROCKET, drive								O					90, Table B-1
	WHEEL, sprocket								O					86, 87, 91, and 92, Table B-1
1305	TRACK, drive				O				O	O		D		
1305	SHOE ASSEMBLY, drive track								O	O				
1311	ARMS, BEARINGS, HUBS, AND SEALS, road wheel				O				O					82.1, 88, and 89, Table B-1
	BUMPER AND BRACKET, road wheel arm								O					
	ROAD WHEEL								O			D		93 and 94, Table B-1
	GROUP 14 STEERING													
1403	BRAKE ASSEMBLY, pivot brake			O					O	F				95, Table B-1
	CONTROLS AND LINKAGE, differential steering brakes				O				O	O				
	CONTROLS AND LINKAGE, pivot brake				O				O					
	DISK, pivot brake								O					
	MASTER CYLINDER, pivot brake								O	F				
	LINING, pivot brake								O					
	LINES, HOSES, AND FITTINGS, pivot brake								O					
	GROUP 15 FRAME AND TOWING ATTACHMENTS													
1503	EYE, towing								O					
	PINTLE, towing								O	O				
	GROUP 16 SHOCK ABSORBERS													
1604	ABSORBER, shock								O	F				96, Table B-1
	GROUP 18 CAB AND HULL													
1801	CONTROLS AND LINKAGE, doors				O				O					
	COVER, access, hull bottom				O				O	F				
	COVERS AND FASTENERS, blast				O				O	F				
	COVERS AND GRILLES, engine access				O				C	O	F			
	COVER AND SHROUD, track								O	F				
	DEFLECTOR, blast								O	F				

(1) Group No.	(2) Functional group	(3) Maintenance functions										(4) Tools and equipment	(5) Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul		
	GROUP 18 CAB AND HULL —Continued												
1801	DOORS, SEALS, CHANNELS, AND GLASS, cab								O	F		97, Table B-1	
(Cont)	FLOORS, hull and cab							O	O	F			
	INSERTS, threaded							C	O	F			
	WINDSHIELD FRAMES												
	WINDSHIELD GLASS AND SEAL								O				
1806	SEATS AND CUSHIONS								O	F			
	RACKS, BOXES, AND STRAPS								O	F			
	GROUP 20 WINCH AND POWER TAKEOFF												
2001	BAND, brake, winch drum				O				F	F			
	CABLE, winch drum			C					O	F			
	CLUTCH, winch drum				O				F	F			
	CONTROLS, brake and clutch				O				O				
	PIN, shear								O				
2004	WINCH			C					O	F	H		
	POWER TAKEOFF, winch								O	F			
	SHAFT, FLANGE AND U-JOINTS, winch drive			C					O	F			
	GROUP 22 BODY CHASSIS OR HULL ACCESSORY ITEMS											98 and 99, Table B-1	
2201	BOWS AND STANCHIONS, cover							C	C	O			
	COVER, cab							O	O	F			
	COVER, cab, machine gun							O	O	F			
	COVER, missile equipment							O	O	F			
	CURTAIN, flotation							C	C	F			
	FRAME, cab cover							C	C				
2202	MOTOR, BLADE, AND ARM, windshield wiper				O				O				
	WIPER, windshield								O				
2205	LINES AND HOSES, bilge pump, water discharge								O				
	PUMP, bilge			C					O	F			
2210	PLATES, data								O				
	GROUP 33 SPECIAL PURPOSE KITS												
3303	BOX, control, personnel and engine coolant heaters								O				
	BULB, turn signal lamp								O				
	CONTROL, turn signal lights								O				
	COVER, cab, fiberglass								O	O			
	COVER, cargo, insulated								O	F			
	DUCTS AND HOSES, personnel heater								O	F			
	ENGINE COOLANT HEATER KIT							F					
	FLASHER, turn signal								O				
	HEATERS, personnel and engine coolant								O	H			
	IGNITOR, personnel and engine coolant heaters		O						O				

(1) Group No.	(2) Functional group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
3303 (Cont)	GROUP 33 SPECIAL PURPOSE KITS--Continued													
	LAMP, turn signal								O					
	LIGHT, dome, cargo compartment		O						O					
	LINE AND FITTINGS, fuel, personnel and engine coolant heaters		O						O					
	LINE, HOSES, AND FITTINGS, water, engine coolant heater		O						O					
	PERSONNEL HEATER KITS (primary) cab and cargo area							F						
	PERSONNEL HEATER KIT (secondary) cab and cargo area							F						
	PLATE, heater, battery, engine coolant heater								O	F				
	PUMP, fuel, personnel and engine coolant heaters		O						O					
	PUMP, water, engine coolant heater								O	F				
	SWITCH, flame detector, personnel and engine coolant heaters				O				O					
	SWITCHES, heater control box, personnel and engine coolant heaters								O					
	WINDOW, insulated cargo cover								O					
	WIRING HARNESSES, turn signal								F	O				
4701	GROUP 47 WEIGHING AND MEASURING GAGES													
	ADAPTERS, CORES, CABLES, AND SHAFTS, speedometer and tachometer			O					O					
	SPEEDOMETER AND TACHOMETER								O					
7603	GROUP 76 FIRE-FIGHTING EQUIPMENT COMPONENTS													
	CONTROLS, extinguisher CYLINDER		O						O					
	LINE, FITTINGS, AND CONTROLS, fixed fire extinguisher								O					
	TUBES, FITTINGS, AND NOZZLES								O					

Table B-1. Special Tools and Equipment

Tool code	Maintenance level	Description and use	Part number
1	O	SLING, POWER PACK—Used to lift power plant, engine, and differential.	4910-646-6893 (10942647-19207)
2	F	CRADLE ASSEMBLY—Used w / 4910-737-0432 and 4910-789-1017 brackets and 4910-795-0189 stand to support engine out of carrier for maintenance.	4910-795-0198 (7950198-19207)
3	F	STAND, ENGINE MAINTENANCE—Used w / 4910-795-0198 cradle assembly, 4910-737-0432 bracket, and 4910-737-1017 bracket to support engine out of carrier for maintenance.	4910-795-0189 (7950189-19207)
4	F	BRACKET, FRONT—Used for mounting engine in 4910-795-0189 cradle assembly.	4910-737-0432 (10903999-19207)
5	F	BRACKET, REAR—Used for mounting engine in 4910-795-0189 cradle assembly.	4910-789-1017 (11589270-19207)
6	F	STUD—Used to align flywheel housing or engine lower front cover.	5120-872-6015 (KM-J-7540)
7	F	MANOMETER—Used w / 4720-271-9839 hose, 6810-290-0017 mercury, and 8950-823-7664 food coloring to check crankcase pressure, exhaust back pressure, air box pressure, and air intake restrictions.	6685-065-5308 (KM-J-21478-1)
8	F	HOSE, RUBBER—Used w / 6685-065-5308 manometer.	4720-271-9839 (MIL-S-6855B, Class 2, Grade 601)
9	F	MERCURY—Used w / 66850065-5308 manometer.	6810-290-0017 (MIL-M-191, Grade II)
10	F	FOOD COLORING, LIQUID, RED, 8 oz. BOTTLE—Used w / 66850065-5308 manometer.	8950-823-7664 (MIL-F-35093, Type I)
11	F	GAGE ASSEMBLY—Used w / 4910-019-5241 adapter to check cylinder compression.	4910-870-6283 (10899180-19207)
12	F	ADAPTER—Used w / 4910-870-6283 gage assembly to check cylinder compression.	4910-019-5241 (10934456-19207)
13	F	STUD—Used to align cylinder head.	(KM-J-7915-G-01) 4910-591-6634 (KM-J-9665)
14	H	CLAMP SET—Used to locate cylinder liners when installing pistons.	5120-918-0582 (KM-J-9272)
15	H	REMOVE, CYLINDER SLEEVES—Used w / 5120-740-3344 puller to remove cylinder sleeves.	4910-591-6638 (KM-J-7162)
16	H	PULLER, MECHANICAL—Used w / 4910-591-6638 remover to remove cylinder sleeves.	5120-740-3344 (KM-J-7108)
17	F	PULLER KIT—Used to remove camshaft gear, camshaft pulley, and blower gears.	5120-338-6721 (8708724-19207)
18	F	EXPANDER, FRONT OIL SEAL—Used to expand crankshaft front oil seal when installing engine lower front cover.	4910-591-6640 (10949378-19207)
19	F	EXPANDER—Used to expand rear oil seal.	(KM-J-7454) 5120-918-0587 (KM-J-9769)
20	F	HOOK, LIFTING—Used to lift flywheel.	4910-722-3877 (10881880-19207)
21	H	REPLACER, PISTON PIN RETAINERS—Used to replace piston pin retainers.	(KM-J-6361-01) 5120-733-8874 (10881874-19207)
22	H	REMOVER AND REPLACER—Used to remove and replace piston rings.	(KM-J-4895-01) 5120-494-1846 (KM-J-8128)
23	H	COMPRESSOR, PISTON RING—Used to compress piston rings when installing pistons in cylinder liner.	5120-901-8651 (KM-J-6883)
24	H	REMOVER AND REPLACER—Used to remove and replace camshaft and balance shaft bearings.	5180-591-6630 (10949461-19207)
25	H	PULLER, MECHANICAL—Used to remove crankshaft timing gear.	5120-740-3345 (KM-J-4871)
26	H	REPLACER, CRANKSHAFT TIMING GEAR—Used to install crankshaft timing gear on crankshaft.	4910-736-1371 (10949377-19207) (KM-J-7557)

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Tool code	Maintenance level	Description and use	Part number
27	F	REMOVER, VALVE GUIDE—Used to remove valve guide.	4910-591-6632 (10949450-19207)
28	F	REPLACER, VALVE GUIDE—Used to install valve guide.	(KM-J-7775) 5120-872-6014
29	F	REPLACER, VALVE SEAT INSERT—Used to install valve seat inserts in cylinder head.	(KM-J-9729) 4910-603-8925 (10949451-19207)
30	F	TOOL KIT, VALVE SEAT INSERT—Used to remove valve seat inserts.	(KM-J-7790) 5180-591-6631 (10949470-19207)
31	F	COMPRESSOR, VALVE SPRING—Used w/ adapter 5120-999-4052 to remove exhaust valve springs.	(KM-J-7774) 5120-733-8888
32	F	ADAPTER, VALVE SPRING COMPRESSOR—Used w/ compressor 5120-733-8888 to remove exhaust valve springs.	(10881882-19207) 5120-999-4052
33	F	GAGE, THICKNESS—Used to check valve clearance.	(KM-J-7455-7) 5120-670-1767
34	H	INSTALLER, OIL PUMP DRIVE GEAR—Used to install oil pump drive gear on crankshaft.	(KM-J-9708) 4910-591-6639 (10949379-19207)
35	F	REMOVER, INJECTOR—Used to remove injector assembly from cylinder head.	(KM-J-8968-01) 5120-291-8400
36	H	TEST FIXTURE—Used w/ 4910-255-8641 tester to test injectors.	(10881891-19207) 4910-355-6248
37	H	ADAPTER, NEEDLE VALVE—Used w/ 4910-355-6248 test fixture.	(65-928-B) 4910-764-5626
38	H	INSTALLER BODY, INJECTOR—Used w/ 4940-711-1919 installer pilot to install injector tube.	(YA-396) 4940-711-1918 (B-10881893-19207)
39	H	INSTALLER PILOT, INJECTOR—Used w/ 4940-711-1918 installer body to install injector tube.	(KM-J-5286-4) 4940-711-1919 (10881896-19207)
40	H	INSTALLER FLARING DIE, INJECTOR—Used w/ 4910-711-1918 to flare small end of injector tube.	(KM-J-5286-5) 4910-711-1920 (10881892-19207)
41	H	REAMER—Used to clean flat portion of injector nut spray tip seat.	(KM-J-5286-6) 5110-019-5240 (10881903-19207)
42	H	REAMER, SECOND OPERATION—Used to clean injector copper tube.	(KM-J-4986-01) 5110-294-4606 (10881907-19207)
43	H	REAMER—Used to ream carbon from injector spray tip.	(KM-J-5286-9) 5110-319-5085 (5344968-19207)
44	H	REAMER, FIRST OPERATION—Used to clean injector tube.	(KM-J-1243) 5110-785-1016 (10881897-19207)
45	H	REMOVER, SPRAY TIP—Used to remove spray tip from injector nut.	(KM-J-5286-7) 5120-355-6167 (10919988-19207)
46	H	REFINISHER, INJECTOR TUBE TIP—Used to face small end of injector tube.	(KM-J-1291-01) 5120-785-1017 (10881902-19207)
47	F	GAGE—Used to time injector.	(KM-J-5286-8) 5220-387-9581 (10881887-19207)
48	O	WRENCH—Used to torque fuel line nuts.	(KM-J-1853) 5120-019-5232 (10881875-19207)
49	O	WRENCH, OPEN END AND BOX—Used to torque fuel return line nuts.	(KM-J-8932-01) 5120-740-3347 (10949344-19207)
50	F	GAGE, FUEL PRESSURE—Used to check fuel pump output pressure.	6620-671-4509 (10934455-19207) (KM-J-8151-G)

Table B-1. Special Tools and Equipment—Continued

Tool code	Maintenance level	Description and use	Part number
51	F	INSTALLING TOOL, BLOWER DRIVE CAM—Used to install blower drive cam in spring.	4910-591-6633 (KM-J-5209)
52	O	CHARGING EQUIPMENT, AIR BOX—Used to charge air box accumulator.	4910-861-2068 (11615420-19207)
53	H	STAND, TRANSMISSION—Used to hold transmission for teardown and build up.	4910-499-4196
54	H	LIFTING STRAP—Used w / 4910-673-8301 adapter to check converter mounting spacing or remove or install converter drive cover.	4910-572-8608 (8356175-19207)
55	H	COMPRESSOR, CLUTCH PACKAGE—Used to compress and hold clutch package during installation and removal or to compress reverse clutch package to remove or install holding pin.	4910-572-8643 (8356187-19207)
56	H	HOLDER, STATOR ROLLERS—Used to hold stator rollers and springs during assembly.	4910-572-8688 (8356195-19207)
57	H	PULLER BOLT—Used to remove ground sleeve diaphragm assembly.	4910-572-8699 (8356200-19207)
58	H	BOLT—Used to hold intermediate clutch back plate in position during build up and disassembly.	4910-572-8701 (8356186-19207)
59	H	EYE, LIFTING—Used w / 4910-572-8608 strap to lift high-range clutch package and converter drive cover.	4910-673-3801 (10865773-19207)
60	F	HANDLE, REPLACERS—Used w / 5120-572-8660, 5120-572-8658, 5120-572-8615, 5120-572-8656, and 5120-759-5415 replacers to install front oil pump seal, high clutch housing bushing, output bearing and seal, converter drive cover bushing, and output shaft bushing.	5120-316-9182 (7950864-19207)
61	H	REMOVER AND REPLACER, KIT—Used to remove and replace clutch piston return spring retaining ring.	5120-572-8607 (8356170-19207)
62	H	REPLACER—Used w / 5120-316-9182 handle to install output bearing and oil seal.	5120-572-8615 (8356185-19207)
63	H	REPLACER—Used w / 5120-316-9182 handle to install converter drive cover bushing.	5120-572-8656 (8356202-19207)
64	H	REPLACER—Used w / 5120-316-9182 handle to install high clutch housing bearing.	5120-572-8658 (8356174-19207)
65	H	SNAP RING DRIVER KIT—Used to install turbine shaft snap rings.	5120-572-8663 (8356191-19207)
66	F	REPLACER—Used w / 5120-316-9182 handle to install front oil pump seal.	5120-672-8660 (8356178-19207)
67	F	PULLER—Used to remove rear seal.	5120-572-8712 (8356201-19207)
68	F	PRESSURE GAGE KIT—Used to check transmission oil pressure.	4910-572-8612 (8356176-19207)
69	F	SLING, TRANSMISSION—Used to lift transmission and to mount transmission in stand.	4910-572-8614 (8356184-19207)
70	H	GUIDE BOLT SET—Used to position front and rear oil pumps and front and rear pitot tubes and diaphragm.	4910-572-8710 (8356165-19207)
71	O	REMOVER AND REPLACER—Used to remove and replace transmission and differential resilient mounts.	5120-740-3346 (10943279-19207)
72	H	REPLACER—Used to install transfer gearcase retainer and housing bearing cups.	5120-776-1864 (10886353-19207)
73	O	ADAPTER, TORQUE WRENCH—Used to torque power train 6C universal joint screws.	5120-977-7421 (10917666-19207)
74	O	LIFTING BAR—Used to remove and replace final drive.	5120-918-0586 (11589384-19207)
75	H	REMOVER AND REPLACER, OIL SEAL—Used to remove and replace final drive output shaft oil seal.	5120-771-7020 (10875385-19207)
76	H	REMOVER AND REPLACER, OIL SEAL—Used to remove and replace final drive output shaft spacer, retainer, and bearing; and used w / 5315-834-0118 pin and 5120-678-2796 replacer to replace compensating idler arm spindle inner and outer bearing.	5120-771-7018 (10875326-19207)
77	H	PIN, STRAIGHT, HEADLESS—Used w / 5120-771-7018 replacer (3 required per operation).	5315-834-0118 (MS16556-367)
78	H	TOOL, DIFFERENTIAL BACKLASH—Used as aligning tool in conjunction with dial indicator.	5120-074-1164 (10942815-19207)

Table B-1. Special Tools and Equipment - Continued

Tool code	Maintenance level	Description and use	Part number
79	H	DRIVER PLUG, BEARING AND BUSHING — Used to remove and replace right angle drive pinion inner and outer bearings.	5120-649-8126 (10865981-19207)
80	H	REMOVER AND REPLACER — Used w/5120-678-2798 remover and replacer to remove right angle pinion gear from housing.	5120-649-8140 (10865984-19207)
81	H	REMOVER AND REPLACER, SLEEVE, SNAP RING — Used to replace right angle drive hub bearing.	5120-678-2789 (10865770-19207)
82	O	REPLACER — Used to remove right angle drive pinion gear; used w/5120-649-8140 sleeve to remove right angle drive carrier and outer bearing, and to replace right angle drive pinion bearing cap oil seal or differential shaft bearing cap oil seal; remove and replace idler and road wheel arm housing bearings and oil seal.	5120-678-2798 (8763117-19207)
82.1	O	REPLACER — Used to replace idler and road wheel arm housing bearings and oil seals.	(12269522-19207)
83	H	REMOVER AND REPLACER — Used to remove and replace output shaft bearing.	5120-771-7019 (10874765-19207)
84	O	WRENCH, PLUG — Used to remove and replace torsion bar plug.	5120-053-3625 (10932504)
85	O	ADAPTER, MECHANICAL PULLER — Used w/5120-557-3615 puller to remove torsion bar.	5120-322-5953 (7083703-19207)
86	O	ADAPTER — Used w/5130-790-2284 hydraulic impact wrench to remove torsion bar and trunnion nut, and w/5120-557-3615 puller to remove track pin.	5120-933-8458 (11592843-19207)
87	O	PULLER, SLIDE HAMMER TYPE — Used w/5120-322-5953 adapter to remove torsion bar, and w/5120-933-8358 to remove track pin.	5120-557-3615 (5573615-19207)
88	O	REPLACER, WHEEL HUB GREASE CUP — Used to install idler and road wheel hub inner and outer bearing cups (M730).	5120-678-2796 (10863002-19207)
88.1	O	REPLACER, WHEEL HUB BEARING — Used to replace wheel hub bearings (M730A1).	5120-01-102-4627 (12269371-19207)
89	O	REPLACER, OIL SEAL — Used to install idler and road wheel hub oil seals.	5120-678-2797 (10863001-19207)
90	O	GAGE, SPROCKET WEAR — Used to check track and drive sprocket wear.	5120-01-041-9920 (12253280-19207)
91	O	FIXTURE, TRACK CONNECTING — Used to disconnect and connect tracks (2 required per operation).	5120-01-041-4624 (12253183-19207)
92	O	DRIFT PIN — Used to disconnect tracks.	5120-678-2795 (11678717-19207)
93	O	LIFTER, ROAD WHEEL — Used to lift road wheels.	5120-01-062-5607 (12268612-19207)
93.1	O	ADAPTER, TORQUE WRENCH — Used to torque power train 7C universal joint screws.	5120-00-213-6976 (11663358-1-19207)
94		Deleted.	
95	F	REMOVER AND REPLACER — Used to remove and replace pivot steer piston drag unit.	5120-966-5951 (10942469-19207)
96	O	REMOVER, SHOCK ABSORBER — Used to remove shock absorber.	5120-01-102-4628 (12269380-19207)
97	F	TOOL SET — Used to remove and replace oversize Rosan inserts	5180-966-5961 (10932474-19207)
98	H	REMOVER, FUEL VALVE SCREEN — Used to remove heater fuel valve screen.	5120-735-5871 (7355871-19207)
99	H	SCRAPER, CARBON — Used to remove carbon from heater combustion chamber.	5120-735-5872 (7355872-19207)
100	O	CLEANING TOOL, RADIATOR — Used to clean radiator fins without removing the radiator from the carrier.	4910-00-611-6559 (11678393-19207)
101	O	REPLACER — Used to install idler wheel hub bearing cups (M730A1).	5120-01-102-4627 (12269371-19207)

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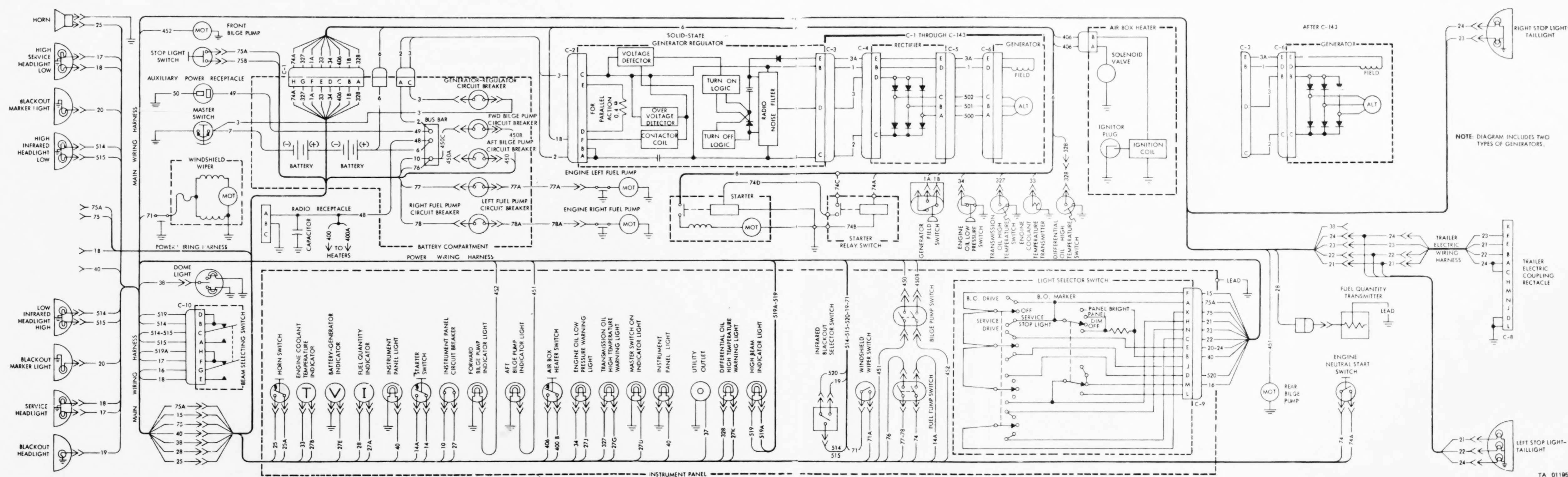


Figure 2-4. Electrical circuit diagram.

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